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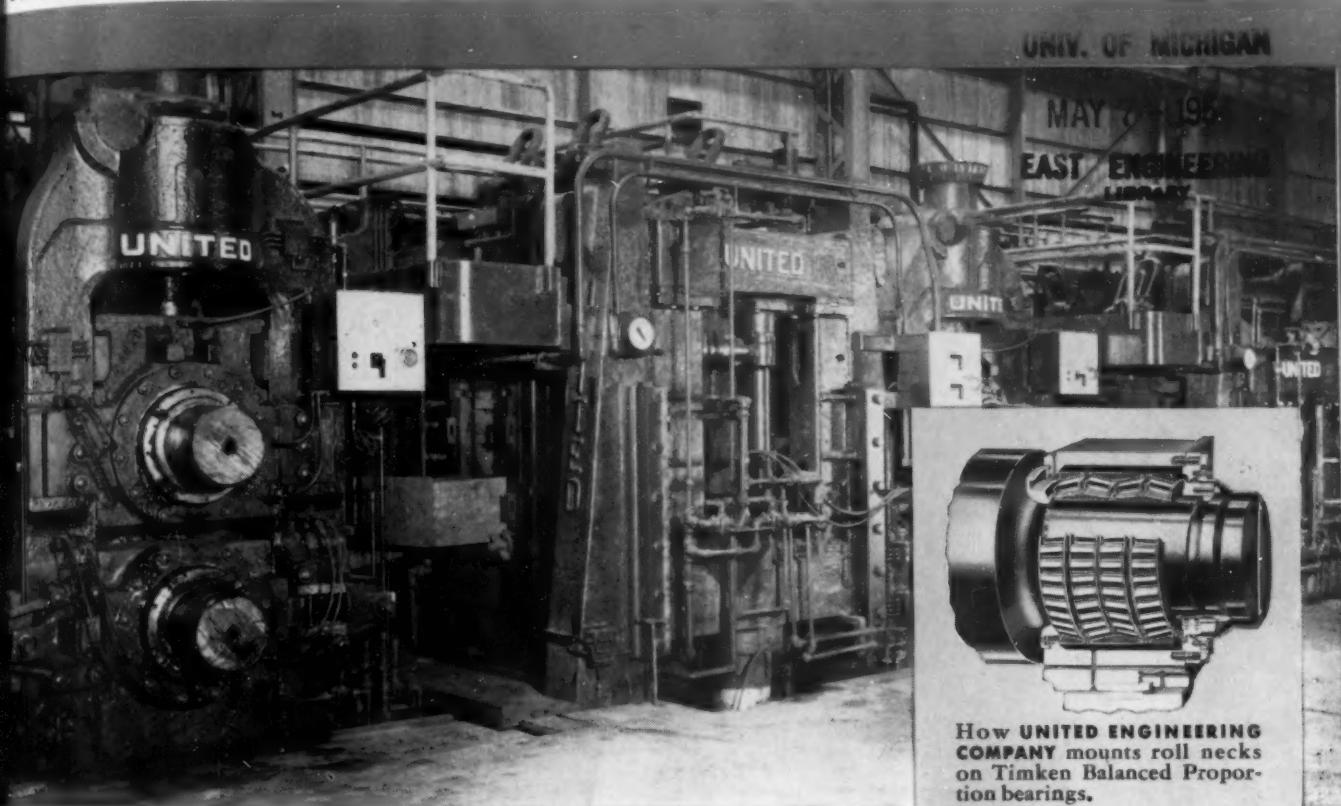
PUBLICATION

the Iron Age

E NATIONAL METALWORKING WEEKLY

May 6, 1954

ENTS PAGE 2



How UNITED ENGINEERING COMPANY mounts roll necks on Timken Balanced Proportion bearings.

New Fairless Works billet mill gets extra bearing capacity in same space

with TIMKEN® Balanced Proportion Bearings

HERE'S another mill equipped with Timken® Balanced Proportion Bearings—a new 10-stand billet mill at U. S. Steel's Fairless Works. These bearings are among the more than 3000 Timken tapered roller bearings used in the Fairless Works!

Timken Balanced Proportion bearings have load ratings up to 40% higher than the same-size bearings in the older design. In some mills, they increase bearing life expectancy almost three times! Moreover, Timken Balanced Proportion bearings make possible a 50 to 60% increase in neck strength which means greater rigidity and higher rolling precision.

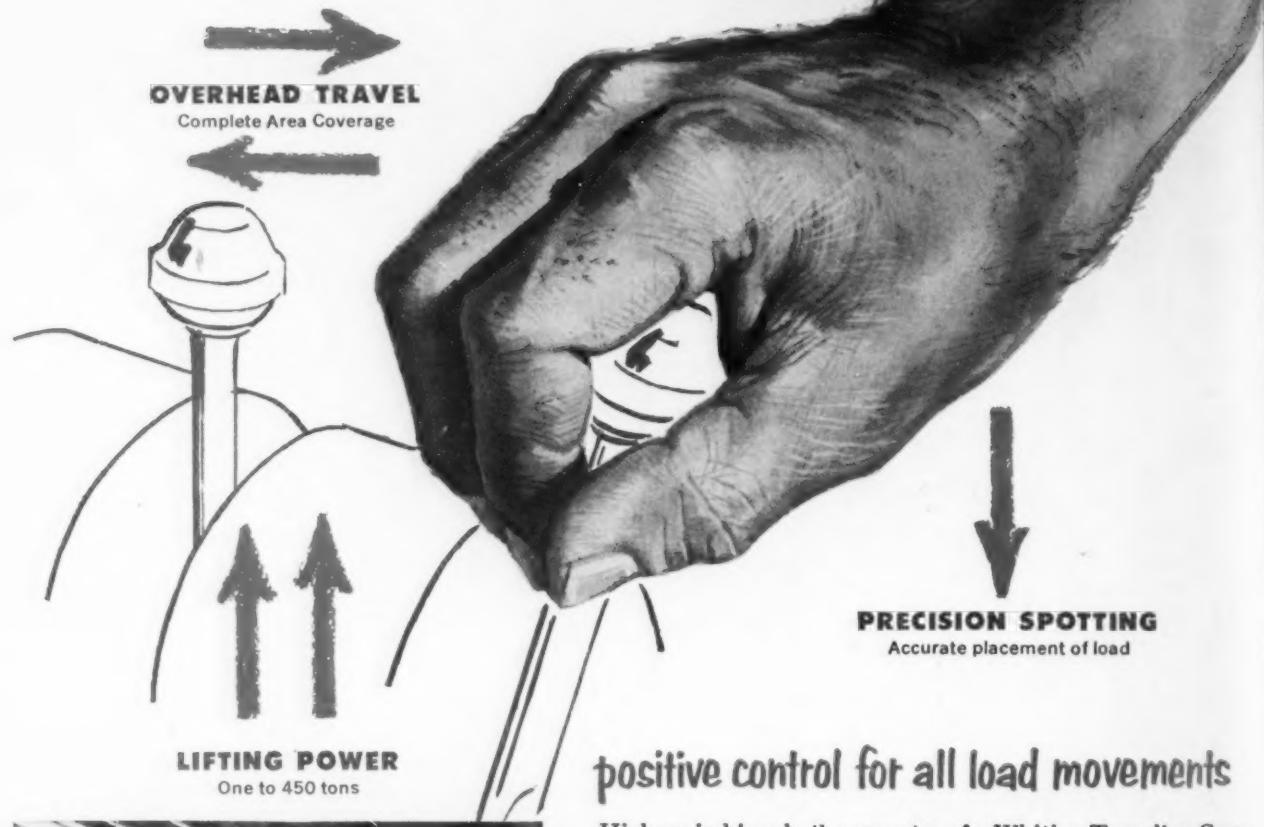
To make these truly significant improvements in an already good bearing design, Timken Company engineers made an exhaustive study of steel mill bearing requirements. Ultimately they developed the Balanced Pro-

portion design. Rollers are longer, permitting higher loads—and thinner, permitting larger bores and stronger roll necks. Timken Balanced Proportion bearings have now been applied to numerous types of mills.

Timken tapered roller bearings are a sure sign of quality on the steel mill machinery you buy or build. Always look for the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

at his fingertips...



positive control for all load movements

High up in his cab, the operator of a Whiting Traveling Crane guides his brawny, powerful giant just by moving his fingertips. Whiting Magnetic Controls give the operator positive and precise control of all movements, making it easy to lift, move and "spot" each load quickly and accurately. Improved crane operation like this increases the productivity of the whole plant . . . and that's why Whiting Cranes are selected to handle the big jobs—loads up to 450 tons. In industry after industry, Whiting's engineering skill and 70 years of experience show the way to solve important handling problems. Write for complete facts, today!

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Operator has unobstructed view of the plant floor and the hoist. Whiting's Full Vision Cab and compact Magnetic Controls make this possible.

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Trackmobile



Trambeam Overhead
Handling Systems

Whiting Corporation also manufactures Railroad, Foundry and Aviation Equipment; Swenson Equipment for the Chemical Process Industries and Metal-Working Machinery.

What Does Grain Size Mean In An Alloy Steel?

This is the third of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

The grain size of alloy steels is understood to mean austenitic or inherent grain size. Austenitic grain size should be distinguished from ferritic grain size, which is the size of the grains in the as-rolled or as-forged condition with the exception of those steels that are austenitic at room temperature. When steel is heated through the critical range (approximately 1350 to 1600 deg F for most steels, depending on the composition), transformation to austenite takes place. The austenite grains are extremely small when first formed, but grow in size as the temperature above the critical range is increased, and, to a limited extent, as the time is increased. It is apparent, therefore, that both time and temperature must be constant in order to obtain reproducible results.

When temperatures are raised materially above the critical range, different steels show wide variations in grain size, depending on the chemical composition and the deoxidation practice used in making the heat. Heats are customarily deoxidized with aluminum, ferrosilicon, or a combination of deoxidizing elements. Steels using aluminum or certain other deoxidizers in carefully-controlled amounts maintain a slow rate of grain growth at 1700 deg F, while heats finished with still other deoxidizers, usually ferrosilicon, develop relatively large austenitic grain size at temperatures somewhat below 1700 deg F.

The McQuaid-Ehn test is the one ordinarily used for determining grain size. Steel is rated with a set of eight ASTM charts that are compared one at a

time with a specially-prepared steel sample until one is found to match. Number 1 grain size, the coarsest, shows 1½ grains per sq in. of steel area examined at 100 diameters magnification. The finest chart is Number 8, which shows 96 or more grains per sq in. at the same magnification.

PROPERTIES AFFECTED BY GRAIN SIZE

Fine-grain steels (grain sizes 5, 6, 7, and 8) do not harden as deeply as coarse-grain steels, and they have less tendency to crack during heat-treatment. Fine-grain steels exhibit greater toughness and shock-resistance—properties that make them suitable for applications involving moving loads and high impact. Practically all alloy steels are produced with fine-grain structures.

Coarse-grain steels exhibit definite machining superiority. For this reason a few parts which are intricately machined are made to coarse-grain practice.

The correct specification and determination of grain structure in steel is a subject that has been given long study by Bethlehem metallurgists. If you would like suggestions on this or any other problem concerning alloy steels, these men will be glad to give you all possible help.

In addition to manufacturing the entire range of AISI alloy steels, Bethlehem produces special-analysis steels and the full range of carbon grades.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM ALLOY STEELS



Vol. 173, No. 18, May 6, 1954

*Starred items are digested at the right.

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THE IRON AGE, published every Thursday by CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1952, at the Post Office at Philadelphia under the act of March 3, 1879. \$5 for 1 year, \$3 for 2 years in United States, its territories and Canada; other Western Hemisphere Countries, \$15; other Foreign Countries, \$25 per year. Single copies, 50¢. Annual Review Issue, \$2.00. Cables: "Ironage," N. Y.

Address mail to 100 E. 42 St., N. Y. 17, N. Y.

NEWS DEVELOPMENTS

STEELWORKERS MAP DEMANDS, STRATEGY — P. 77
Contract demands formulated this week by the United Steel Workers of America will get a cold reception from the steel industry. Industry leaders are in no mood to concede anything that will hike labor costs to the point where a compensating price increase would be necessary. Talks start within 2 weeks.

REPUBLIC'S WHITE PLOTS NEW TARGETS — P. 80
Republic Steel Corp. is continuing to diversify its operations, Charles M. White, president, revealed in New York. High on the list is development of its new rutile holdings in Mexico. The firm had added a nuclear expert to its staff to study steel industry applications, and will enter housing "indirectly."

U. S. MACHINERY SENT TO RED STEEL MILL — P. 87
Until this year Bulgaria was the only Eastern-bloc country without a steel industry. Now it does—thanks largely to machinery supplied by the West, including the U. S. Production at Bulgaria's Lenin steelworks began early this year and about 90 pct of the equipment is reported of Free World origin.

FORD, ORDNANCE MOTHBALL TANK TOOLING — P. 89
Ford Motor Co. and Army Ordnance have cooperated in a layaway program of tank production tooling that could save a full year's production of tanks if an emergency arises. Idea of storing an entire plant's production tooling in a government warehouse is unique, but will be repeated in other defense plant areas.

DON'T BE FOOLED BY UNEMPLOYMENT RISE — P. 95
June unemployment will show a sharp rise, will top 4 million, may near 4.5 million. Increase will be due to graduation of 1.5 million high school, college students, but there may be some efforts to use these statistics to prove recession's deepening. It isn't. Why your firm may put in profit sharing plan.

AMERICAN UNIFIED ON UNITIZED BODY — P. 98
Nash and Hudson both use unitized type body construction. Points up savings possible through use of common subassemblies. Method eliminates frame, stresses body to carry loads. Detail advantages, disadvantages. There are rumors, particularly on two GM divisions, that others may adopt unitized body.

of the Week in Metalworking

ENGINEERING & PRODUCTION

TRAPPED RUBBER DIES INCREASE OUTPUT — P. 121
Trapped rubber dies used in a drop hammer and with conventional form blocks have helped one aircraft company boost part production rate and improve part quality. Output was raised from 300 to 1250 pieces per 16-hr day. Engineers visualize future production as high as 1800 formed parts per day.

PLASTIC WELDED PARTS COST LITTLE — P. 124
Welding fixtures made of cast phenolin resin offer a substantial cost advantage over metal fixtures. Design time is often eliminated entirely, and average fabricating time is reduced to about one fifth. Resin is cast around a sample part set in a wooden box, then cured in the usual manner.

REPORT ON TITANIUM MACHINABILITY — P. 128
Basic titanium machinability data needed for long range planning has been provided in the U.S. Air Force Machinability Report for 1954. Here are feeds, speeds, tool life, power requirements and other important data to use as a guide in programming more titanium through your plant.

LOW CARBON STEEL RESISTS CORROSION — P. 132
Low carbon stainless steels used in place of more familiar stainless grades offer a solution to some of the problems of intergranular corrosion. Lower carbon grades can be used to replace higher carbon types. Failure of parts too complex for solution treating can often be avoided through use of low carbon stainless.

SHORT-CYCLE NORMALIZING AIDS OUTPUT — P. 136
Short-cycle normalizing equipment keeps pace with two high-production tube mills in which welding speeds range from 40 to 120 fpm and 50 to 150 fpm. It also stays in thermal pace at reduced mill production. Equipment takes about one-third the floor space needed for conventional furnaces.

NEXT WEEK—BENEFITS OF ULTRASONIC TESTING
Cost savings in the manufacture of forgings can be obtained through the use of ultrasonic tests for determining ingot soundness before forging. Test is rapid, reliable and inexpensive. At Allis-Chalmers, about 50 ingots, ranging from 70-in. octagon to 42-in. ingots have been tested ultrasonically with good results.

MARKETS & PRICES

STEEL EARNINGS OFF 13 PCT IN QUARTER — P. 78
Although production of steel in the first quarter was 23 pct under first quarter 1953, the industry's earnings declined only 12.9 pct. Earnings picture is based on an IRON AGE study of 23 firms totaling more than 83 pct of the nation's steel capacity. Individual results varied widely.

METAL POWDER MEN SEE NO DECLINE IN '54 — P. 79
Despite a poor start in the first quarter and lower military and electronics volume, metal powder men look ahead for a good year—at least equaling and perhaps topping 1953. Powder dip lagged behind overall industry slump last year. Not affected by usual seasonal patterns.

BRITISH STEEL PRICE HIKE COMING SOON — P. 87
Even though they don't want to, British steel mills will soon raise prices. Except for flat-rolled items which are still tight, supply and demand are just about in balance and producers fear an increase might hurt sales. But higher costs for coal, pig iron and transportation force the boost.

OPTIMISTIC ON CONSUMER BUYING TREND — P. 103
Wholesalers and retailers report some increases in sales volume. While still spotty, this indicates a clear-cut trend to heavier consumer buying. Employment is definitely on the rise. Tax savings are being plowed back into more spending. Upturn in appliance, auto buying, building are brightest spots.

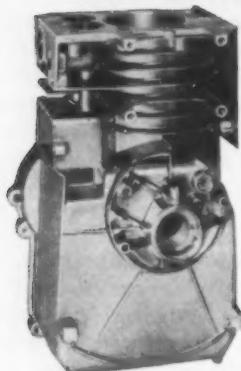
STEEL PEOPLE THINK BUSINESS WILL GAIN — P. 199
Steel officials are again mentioning an expected increase in business. But their optimism is guarded; most of them guessed wrong in predictions early this year. They now mention slight improvement or mild upturn. Iron Age field reports from steelmaking districts indicate the upturn has already started.

FLEMMING TELLS MORE ABOUT STOCKPILING — P. 202
Announcement of new long-term stockpiling program had an immediately beneficial effect on slower markets. Now metal men want to know more details. Mobilizer Flemming answers some questions. No rules are set up to aid distressed industries but such help is not ruled out. Directive may come next week.

AJAX INDUCTION FURNACES

BRIGGS & STRATTON CORPORATION

1,000,000
INDUSTRIAL
ENGINES



AJAX
TAMA-WYATT



AJAX ENGINEERING CORP., TRENTON 7, N. J.
INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting



AJAX
U.S.A.

With holding furnaces of 20 kW similar to that in the photo above, and melting furnaces of 100 kW, Briggs & Stratton Corp., Milwaukee, Wisc., is getting increased production under cleaner, more satisfactory working conditions than ever before, and at lower operating costs.

The intricate die-cast aluminum cylinder shown at the left is one of many produced at the B & S plant from high grade aluminum alloy melted in low-frequency AJAX induction furnaces. In these furnaces only the metal is heated. Energy is transmitted to the molten charge without actual contact through the refractory walls. There are no resistors or other parts having a higher temperature than is absolutely necessary for properly melting the charge. Over-heating is avoided, and there is practically no oxidation.

The holding furnaces next to the die-casting machines as well as the melting furnaces are automatically controlled at a temperature within $\pm 5^{\circ}$ F., holding the metal at the lowest feasible casting temperature. The agitation due to internal electrical stirring in the metal gives the best conditions for holding furnaces, and there is little possibility of sludge formation at the bottom, because this is where the heat is generated.

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THE IRON AGE

Editorial, Advertising and Circulation
Offices, 100 E. 42nd St., N. Y. 17, N. Y.
Oxford 7-3400

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One of the Publications Owned and
Published by Chilton Co., Inc., Chest-
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Editorial

The Iron Age

FOUNDED 1833

Don't Outfox Yourself

PERHAPS you head up one of the many companies which have cleared the decks for action. Chances are you have cut (or are cutting) expenses, inventories and some jobs.

When doing this you may have felt that things were going to pot. Perhaps certain signs led you to believe we were "in for it." The precautions you took were the tried and true ones of the past. They had proved themselves.

Perhaps too you spend money on new research projects. Maybe too you added that new product you always wanted to slay the competition with. Then too you also must have felt that sales and promotion expenses should not be cut—if you were to stay up front.

When you cut your inventories you went to the bone. Your current ordering of raw material was slashed while you used up what you had and also got rid of some cats and dogs. You turned inventory into cash or at least into saleable finished products. Maybe you had not noticed that buying by the man on the street had changed but little.

You cut expenses because you found by experience that the only way to reduce them is to cut them. Of course it was possible to get more for the money you were spending. But with the business outlook being what it was maybe you thought rough cutting was best.

When you eliminated jobs you went about it cautiously. You studied the job requirements and felt that this job could go or that one could be merged. Some layoffs may not have been the result of less business. Maybe they were the result of proper machinery planning—or just plain "savings."

But now things look a little better. Do you want to go on cutting expenses? Do you really want to get inventories to the point where you don't have what your customer wants when he wants it? Do you want to seriously study layoffs and realize that those carried out to save money alone—while your business looks better—mean loss of customers for your product?

Whatever you have done hundreds or thousands like you have done. If all of you slowed down your economy trend anything could happen. If from here on you bought like you want your customer to buy you wouldn't have too many business worries.

Whatever you do don't outfox yourself. The final accounting could be quite painful.

Tom Campbell

Editor



Traveloader[®]

**cuts "man-handling" by 75%
for Superior Separator Company**

Superior Separator Company of Hopkins, Minnesota, manufacturer of nationally-known "Farmband" handling products for agriculture, learned how non-productive manpower could be released for profit-making work. TRAVELOADER and two men are doing more work than was formerly accomplished with eight men and three machines! Superior Separator is one of the country's largest users of seamless tubing, and large stocks of tubing and other raw materials are efficiently handled from storage yard to plant with the TRAVELOADER.

Before TRAVELOADER, a mobile crane, a fork truck, and trailer wagons plus a labor force of eight men, brought materials from storage yard to loading dock for delivery to production departments. Now, only two men and one TRAVELOADER do the whole job ... and do it better!

Not only has TRAVELOADER been used for handling raw materials ... tubing, structural steel, and plywood ... but, for the handling of delicate welding jigs which are stored outside when not in use. The previous

method of handling caused damage to welding jigs and other materials . . . a costly unnecessary expense has been eliminated because TRAVELOADER lifts, carries, and unloads gently and securely.

"TRAVELOADER is the finest single piece of materials handling equipment I have ever worked with" says Mr. Russell Wolf, Factory Manager at Superior. And he knows materials handling equipment because his firm builds these products for farm use.

Write for Bulletin 1360. It completely describes the remarkable TRAVELOADER that carries like a straddle truck, delivers like a road truck, and stacks like a fork truck. The Baker-Raulang Company, 1227 West 80th Street, Cleveland 2, Ohio.

Baker
industrial trucks

Dear Editor:

Letters from readers

God and the H-Bomb

Sir:

You write many splendid editorials which I read with profit and inspiration. You have never done one more timely and appropriate than "God and the H-Bomb." I would like to have some reprints to pass along to friends and associates who may not have seen it—a dozen or two if available.

If I may be so bold, I would like to supplement your thinking in this regard. The fear of atomic weapons and the ruthless imposers of totalitarian communism has driven many people to seek refuge, and in that flight they have turned to God and Christ. But should we not look on the Divine not simply as a protector, like chicks scuttle to the mother hen when a storm approaches; but rather should we not realize that God is all-good, and all-wise, and that our devotion to Him should be because He is our loving father, whom we need at all times, good as well as direful, in prosperity as well as in danger. Let us understand Him as our ever-present need and not merely as security when we mistrust our own resources and strength.

It is good to have the fear of the Lord come upon us, but how much better to come to His love because of our free love.

I hope I have not been presumptuous in expressing these thoughts in the face of such an excellent message as yours. However, you doubtless also feel that there is more to be said than you have said therein, and hope sometime you will give the second half of the message in far better phrases than mine.

H. D. GREENFIELD

Camden, S. C.

Statistics

Sir:

We understand that there are no more than about 200 blast furnaces in the United States. Will you kindly let us have your own information on this point.

E. F. COHEN

Michel-Cather, Inc.
New York

There are 260 blast furnaces in the United States.—Ed.

Carbon Analysis

Sir:

Reference is made to a newsfront item on p. 63 of your Apr. 15 issue:

"A simplified apparatus for analysis of carbon in metals recently devel-

oped has a precision equal to that obtained with high vacuum equipment, it is reported. The method can be applied to a variety of metals other than iron and steels."

Will you please inform us the name of the apparatus above and also the manufacturer's name and address.

A. KERZNER

New Jersey Metals Co.
Elizabeth, N. J.

The device was developed by Messrs. Pepkowitz and Mook, of Knolls Atomic Power Laboratory, Schenectady. Details will be found in your nearest AEC depositary library under AECU 2776.—Ed.

Improved Forging Methods

Sir:

We would appreciate receiving two tear sheets of the article appearing in your Apr. 8 issue entitled "Improved Forging Methods Save Steel, Raise Shell Output."

R. J. HESS
Vice-President

Lake Erie Engineering Corp.
Buffalo

Glass Lathe

Sir:

We refer to your publication of Apr. 1. May we have the name of the manufacturer of the glass lathe machine mentioned on p. 65.

C. EISLER, JR.
Vice-President

Eisler Engineering Co., Inc.
Newark, N. J.

The new glass lathe, which has been designed for specialized glass work in laboratories and in certain types of production operations, was developed and is being manufactured by Bethlehem Apparatus Co., 825 Front St., Hellertown, Pa.—Ed.

Test Determines Stresses

Sir:

Can you send us seven reprints of the following article: "Test Determines Presence of High Residual Stresses in Stainless" by Hyman Kirtchik, appearing in your Apr. 1 issue?

L. HERRICK

Oneida Ltd.
Oneida, N. Y.

Ductile Iron

Sir:

Would you be kind enough to let me have tear sheets on the article "Ductile Iron Makes Good on Tough Jobs" appearing in the Mar. 18 issue.

G. D. SPENCER
Quality Control

Canadian Line Materials Ltd.
Toronto

What does

"S.B."

mean to you?



To some, it means Salad Bowl and a French chef concocting a tasty dish. But, to hundreds of industrial designers, it means Small Balls...the precisioneered kind Universal makes so accurately for smooth operation.

How small is small? Anything from the size of a pinhead up to you-name-it. Universal has special skills for making these perfect peewee pellets. Write for details.

**Universal
Ball co.**

WILLOW GROVE
MONTGOMERY CO., PA.

ANOTHER EXAMPLE OF
SELAS COOPERATIVE ENGINEERING



Precision Production Line For Rail Hardening



Rail Ends Toughened

Automatically In Minutes With Selas Radiant Gas Heat

Longer life for the rails, less maintenance for the railroads and more comfort for the passengers result from a completely automatic rail hardening process, cooperatively developed by Selas and steel mill engineers.

A line of radiant burners combines high temperatures, automatic operation, precise controllability and protective atmospheres to produce the finest end-hardened rails. Exact timing devices keep rail ends beneath each burner to reach the precise heat in a matter of seconds. Four heat elements bring temperatures to 1600 degrees F. Then a sudden blast of cold air under 100 pounds pressure provides the toughening cooling which hardens the steel.

This is just one of hundreds of examples of how Selas Engineers working throughout the metal industry have speeded up heat treating, metal fusion, brazing, forging and other operations. Let them help you in your metal processing. Write for information about the process in which you are interested.

Rail ends progress automatically under each radiant burner. Final heat of 1600° F. and then air quenched under 100 lb. pressure.



SELAS

CORPORATION OF AMERICA • PHILADELPHIA 34, PENNSYLVANIA

Heat Processing Engineers for Industry • Development • Design • Manufacture

Fatigue Cracks

by William M. Coffey

\$7.76 Per Month

Had to do a pretty hard thing the other day. Took one of our best friends to the hospital because of a complete nervous breakdown. He'd looked bad for the last few months. Wasn't eating regularly, irritated by little things. Just wasn't getting the old kick out of life. He was a real outdoor type, too; used to do a lot of hunting, that sort of thing. But lately you couldn't interest him if a deer came in and laid down by the fireplace.

This guy wasn't a circulation manager. There wasn't any *real* reason. Never thought he'd get like this. Didn't commute. No woman trouble. Had friends for miles around. Ate out a lot.

But we took him to a nice hospital. The doctor said he'd have to stay awhile. They put him in a pleasant, sunny ward with a lot of his friends. We gave him a pat on the back and said, "Pal, have a nice rest. Keep a stiff upper. Don't worry about a thing. Get well. Take your time, come back when things look better and start fresh."

Wonder if Blue Cross takes care of dogs?

May Is Father-Child Month

May 2—Millinery for Summer Day.

May 2—Humane Day.

May 2-8—Be Kind To Animals Week.

May 7—May Fellowship Day.

May 15—Straw Hat Day.

May 15-22—National Luggage Week.

May 15-22—Let's Go Fishing Week.

May 17-23—Letters From America Week.

May 17-24—National Foot Health Week.

May 20—"Mecklenburg Declaration of Independence" anniversary. Legal holiday in North Carolina.

May 23—Rural Life Day.

May 23-29—National Secretaries Week.

May 26—National Secretaries Day.

Exercisers Anonymous

Our best season for not exercising will soon be on us in full force. As you know it's relatively easy to dodge exercise in the winter. It's the summertime that brings to the fore the great need for Exercisers Anonymous—the club that helps people to give up exercising who can't help themselves. So here is a

check-list for things you must do now. Don't put them off.

First, check your hammock. This is most important. An Exerciser Anonymous without a hammock is like an exerciser without his lawn mower (pardon the expression). Inspect it carefully for frayed ends, moth bites and color. It is always a good idea to have your wife give it a good cleaning. Be sure to check your ropes. Remember, your hammock is only as good as your ropes! And check those trees for strength and shade. If you followed our rules during the winter you certainly put on weight—and you may need new trees.

Second, check your shaker for dents, mulch, dried mint leaves from last summer. We never take a chance with an old shaker. We always buy a new one for the season. For who would want to be caught by his friends using a dingy, worn shaker? Have one you are proud of!

Third, this year put more emphasis on properly placing your hammock side-table. Place it right the first time and you won't have to get up and keep shifting it. If you are right-handed, place it to the right within easy reaching distance for magazines, cigars, candy, grapes, etc. DO NOT place it so you have to strain to reach it. Personally supervise this operation. Take a test run in the hammock. Have your wife experiment with different adjustments. Remember, it's your hammock and your table. Make them work for you, not someone else.

We'll have more checkpoints next week.

Puzzler

The wrist watch second hand travels 26.06 miles in the course of a year (April 15 puzzler). Winners: Nancy McCormick, Kenneth R. Hill, C. A. Imlund, Chas. B. Heilman, Howard Schwartz, I. M. Shinners, M. Duran, Gordon McMillin, Donald Lasof, John E. Becker and F. A. Bellamy. Norman, did your secretary give you a bum steer?

New Puzzler

A man wanted to build a race track with only one circular segment and with both tangents meeting at a point; each tangent and the circular segment to be of equal length, one-third of a mile each. What would be the radius of the curved portion of the track?

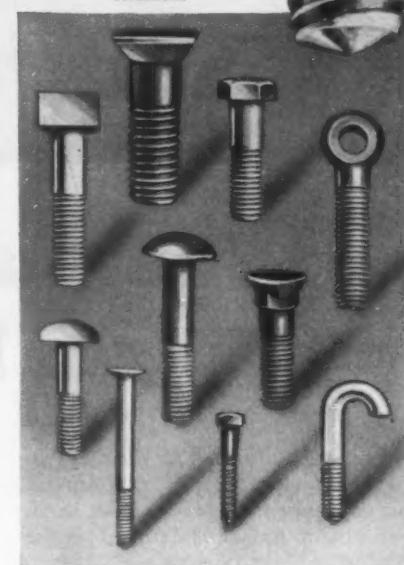
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Pawtucket eye bolts are made in standard sizes $\frac{1}{4}$ " and larger, or to your specifications. In any size, you can depend on uniform Class 3 fit, if required.

All standard steels, stainless steels and non-ferrous metals, including Titanium



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RESEARCH KEEPS

B.F. Goodrich

FIRST IN RUBBER



Where a B. F. Goodrich belt cut labor costs 90%

IT used to take a man an hour or two a day to clean up the mess around that conveyor belt. Sizzling hot sand, from casting molds, is dumped on the belt and carried to storage.

A woven asbestos belt was used, but it had to have "first aid" every three weeks—a sticky dressing to protect it from the 300 degree heat. Then the steaming sand would cling to the belt cover. Some would build up on the return idlers, a great deal dropped on the floor. Clean-up time was costing the company \$900 a year.

Then a B. F. Goodrich man told them his company had developed a special

heat-resisting rubber for belts carrying such things as hot sand, lime, nitrates. Instead of ordinary fabric, B. F. Goodrich uses glass fabric to make a belt that can stand extreme heat.

The foundry installed this B. F. Goodrich belt. It runs 8 hours a day, 5 days a week, handles 75 tons an hour. Since it needs no liquid dressing, there's no sticking, no spillage. Clean-up time has been cut to once every 3 weeks.

Making a belt that stands terrific heat is typical of B. F. Goodrich product improvement. Other BFG improvements have resulted in Grommet V

belts that last 20 to 50% longer, rubber linings which reduce the cost of handling acid and at the same time protect workers from injury—and hundreds of other products that last longer, serve better. To take full advantage of these many and frequent improvements, call in your BFG distributor or write *The B. F. Goodrich Company, Dept. M-232, Akron 18, Ohio.*

B.F. Goodrich
INDUSTRIAL PRODUCTS
DIVISION

Dates to Remember

Meetings

MAY

AMERICAN WELDING SOCIETY — Welding and allied industry exposition, May 5-8, Memorial Auditorium, Buffalo. Society headquarters are at 33 W 39th St., New York.

HYDRAULIC INSTITUTE — May 5-7, Skytop Lodge, Skytop, Pa. Institute headquarters are at 90 West St., New York.

COMPRESSED AIR & GAS INSTITUTE — May 10-12, The Homestead, Hot Springs, Va. Institute headquarters are at 90 West St., New York.

MACHINERY DEALERS NATIONAL ASSN.—Annual convention, May 12-15, Warwick Hotel, Philadelphia. Association headquarters are at 1346 Connecticut Ave., N. W. Washington.

ASSN. OF AMERICAN BATTERY MANUFACTURERS—Spring meeting, May 13-15, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters are at First National Tower Bldg., Akron, Ohio.

EXPOSITIONS

AMERICAN FOUNDRYMAN'S SOCIETY — Annual Foundry Congress & Show, May 8-14, Public Auditorium, Cleveland. Society headquarters are at 616 S. Michigan Ave., Chicago.

THE ALUMINUM ASSN.—Summer meeting, May 14, White Sulphur Springs, W. Va. Association headquarters are at 420 Lexington Ave., New York.

ALUMINUM WARES ASSN. — Annual meeting, May 16-18, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters are at 1506 First National Bank Bldg., Pittsburgh.

INDUSTRIAL FURNACE MANUFACTURERS ASSN., INC.—Spring meeting, May 16-19, The Homestead, Hot Springs, Va. Association headquarters are at 412 Fifth St., N. W., Washington.

AMERICAN SUPPLY & MACHINERY MANUFACTURERS ASSN., INC.—Annual convention, May 17-19, Waldorf-Astoria Hotel, New York. Association headquarters are at 814 Clark Bldg., Pittsburgh.

GAS APPLIANCE MANUFACTURERS ASSN., INC.—Annual meeting, May 19-21, Drake Hotel, Chicago. Association headquarters are at 60 E. 42nd St., New York.

ELECTRIC TOOL INSTITUTE—Spring meeting, May 23-25, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters are at Clark Bldg., Pittsburgh.

COPPER & BRASS RESEARCH ASSN.— Annual meeting, May 23-26, The Homestead, Hot Springs, Va. Association headquarters are at 420 Lexington Ave., New York.

NATIONAL ASSN. OF PURCHASING AGENTS—Annual meeting, May 23-26, Conrad Hilton Hotel, Chicago. Association headquarters are at 11 Park Place, New York.

STEEL BOILER INSTITUTE, INC. — Annual meeting, May 24-25, Atlantic City, N. J. Institute headquarters are at 1308 Land Title Bldg., Broad & Chestnut Sts., Philadelphia.

AMERICAN GAS ASSN.—Production and Chemical conference, May 24-26, William Penn Hotel, Pittsburgh. Association headquarters are at 420 Lexington Ave., New York.

INDUSTRIAL DIAMOND ASSN. OF AMERICA, INC.—Annual meeting and convention, May 25-28, Claridge Hotel, Atlantic City, N. J. Association headquarters are at 124 E. 40th St., New York.

AMERICAN IRON & STEEL INSTITUTE — General meeting, May 26-27, Waldorf-Astoria Hotel, New York. Institute headquarters are at 350 Fifth Ave., New York.

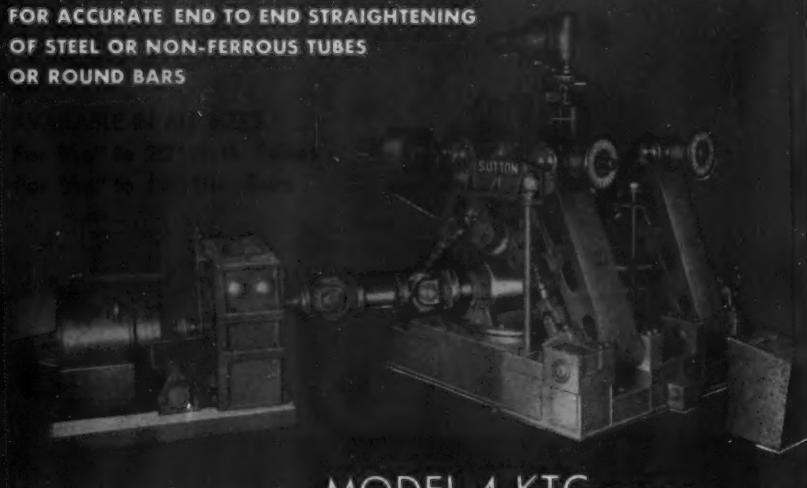
STEEL KITCHEN CABINET MANUFACTURERS ASSN. — May 27-29, White Sulphur Springs, W. Va. Association headquarters are at 1008 Engineers Bldg., Cleveland.

NEW SUTTON 7-Roll STRAIGHTENERS

FOR ACCURATE END TO END STRAIGHTENING

OF STEEL OR NON-FERROUS TUBES

OR ROUND BARS



MODEL 4 KTC (pictured)

TUBES FROM 3 $\frac{5}{8}$ " O.D. to 12" O.D.

BARS FROM 3 $\frac{5}{8}$ " to 7 $\frac{1}{2}$ " Dia.

Patented cluster roll arrangement positively confines work to pass line from entry to delivery without guides. Roll angles are automatically adjusted to proper setting with full contact between work and rolls.

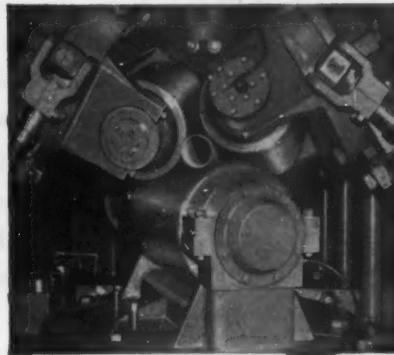
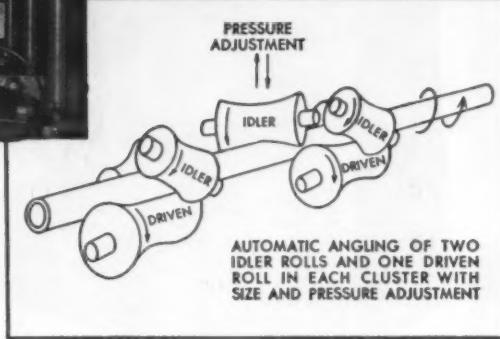


Photo and diagram of 7-roll design shows engineering principle of cluster roll arrangement.

- TRULY GUIDELESS
- HIGH PRODUCTION
- QUALITY STRAIGHTENING



Ask for Bulletin No. 25

SUTTON Engineering COMPANY

Manufacturers for Ferrous and Non-Ferrous Metal Industries

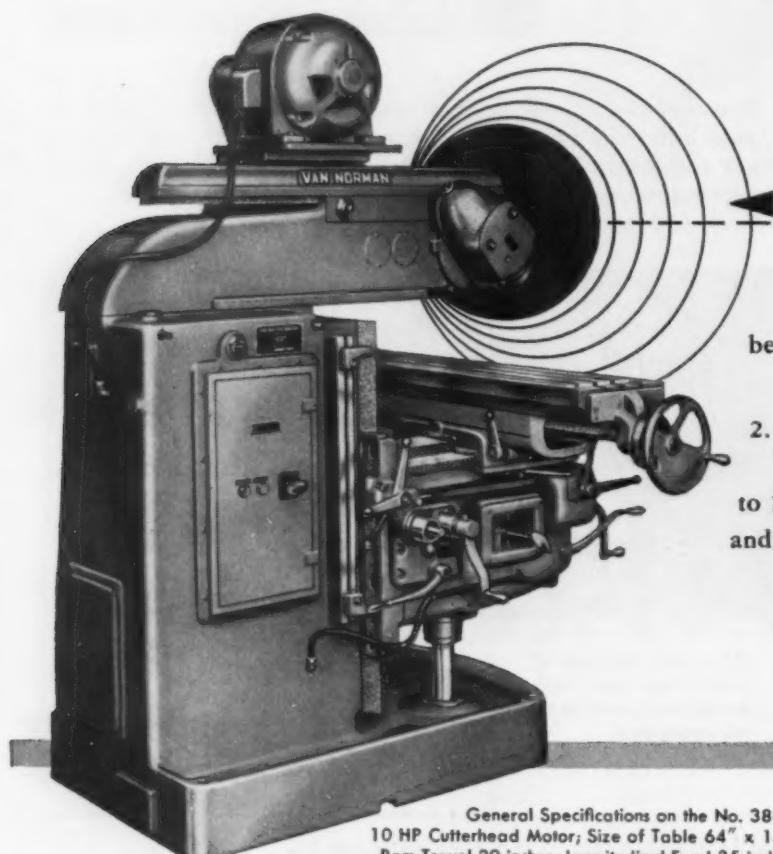
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BELLEFONTE, PENNSYLVANIA

all 10 of Van Norman's new Ram-Type Millers

have this exclusive feature

VAN NORMAN 38-M RAM-TYPE MILLER



General Specifications on the No. 38-M:
10 HP Cutterhead Motor; Size of Table 64" x 14";
Ram Travel 29 inches; Longitudinal Feed 35 inches;
Cross Feed 12 inches; Vertical Feed 21 1/4 inches.

Check the exclusive features
of Van Norman's new Ram-Type
Millers . . . like the No. 38-M
shown at the left. Every
one of these machines has:

1. Maximum "FLEX-ABILITY" . . . because of the quickly adjustable cutterhead mounted on the Heavy Duty sliding ram.
2. Maximum "CUT-ABILITY" is provided through NEW Heavy Duty gears with up to 10 Horse Power Motors. Plenty of Power and Stamina to meet any milling requirement . . . tool room or production . . . it makes no difference to the NEW Van Norman Ram-Type Millers.

VAN NORMAN manufactures Ram and Column Type Milling Machines . . . Cylindrical Grinders . . . Centerless Grinders . . . Spline and Gear Grinders . . . Oscillating Radius Grinders . . . Special Production Grinders.

THE IRON AGE Newsfront

GROWTH OF NEW IRON POWDER PRODUCERS and more efficient processing methods is pressuring down iron powder prices. Some informed sources see even further price reductions. Greater growth in applications for powdered metal parts will result.

INCREASE IN BOTH PRODUCTION AND USES of iron powders for metal powdered parts could make iron powders available within the next decade at the present price of some grades of sheet steel.

LOOK FOR INCREASED INTEREST IN TRANSPARENT PLASTICS for automotive tops. The trend was started this year in Ford and Mercury lines and may get a boost from detachable tops for sports car lines. The Corvette removable top will be Plexiglass, could be made transparent.

GASKETLESS JOINTS developed by the Navy for simple assembly of high pressure stainless steel piping may work well with other types of piping. A collar holds the ends together.

INCREASING INTEREST IN USE OF CADMIUM NICKEL PLATE batteries made by powder metallurgy methods has been shown by some automotive producers. Batteries have advantages for cold weather operation.

MORE CONCENTRATION ON THE MAN IN THE SHOP as a factor in cutting costs through production planning and control is being planned by many progressive managements. Many executives feel even the most efficient systems will collapse unless wholeheartedly accepted by cooperative foremen.

USE OF THE COLD EXTRUSION PROCESS for civilian applications has sparked plenty of interest even though the number of applications increases slowly. Many parts now produced by drop forging will, within 10 years, be made by extrusion methods, metal parts fabricators feel.

STANDARDIZATION OF HIGH MORTALITY PARTS for industrial gas engines used by the Army is being successfully pushed. Goal of this program is to reduce from 1827 to 165 the number of such parts supporting engines within the 2% to 6 in. cylinder bore range.

APPLICATIONS OF PORCELAIN ENAMELED ALUMINUM have barely scratched the surface of potential applications, some sources feel. One source estimates the market for vitreous enamel for aluminum at 200 million lb per year by 1970. Advantages: Light weight, workability and chemical resistance combined with surface hardness.

THE BUILDING BLOCKS OF AUTOMATION, air and hydraulic cylinders, controls, electronic switches, feeders and material handling units are more and more available for use by smaller plants. Many units have been simplified for application to an increasing variety of short run shop tooling problems.

MACHINING BOTH ENDS OF A PART in the same cycle on a single spindle automatic is now possible with a high degree of economy. A new machine recently demonstrated has simplified this job considerably.

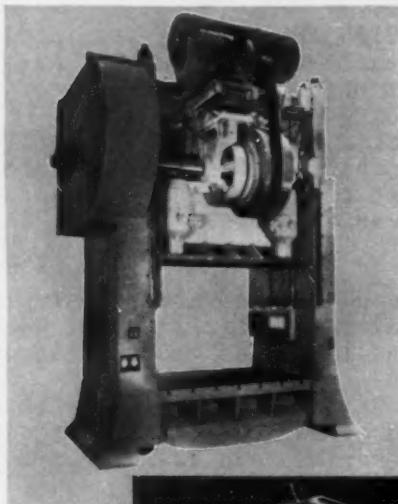
you get more...

out of every press with a
CLEVELAND DRUM TYPE CLUTCH!

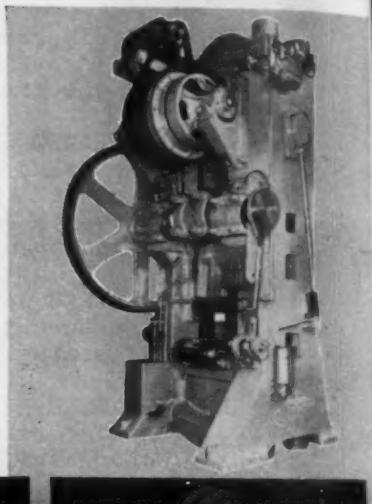
TWO POINT PRESS TWIN DRIVE



TWO POINT PRESS SINGLE END DRIVE



KNUCKLE JOINT PRESS



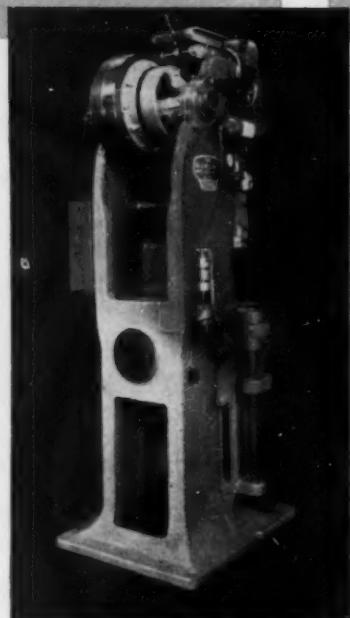
Extensive field use proves that the patented Cleveland Clutch and Brake improves all types of press performance. In every case operating records indicate less press downtime due to clutch failure; extended die life because of greater slide control.

Simplicity of design makes this air-operated clutch practically foolproof. Clutch and Brake cannot become separated or engaged simultaneously for they are a combined unit of one-piece construction. Positive, spring loaded brake brings slide to immediate stop on failure of electric current or air supply. Design and lightness of parts contribute to quicker starting and stopping.

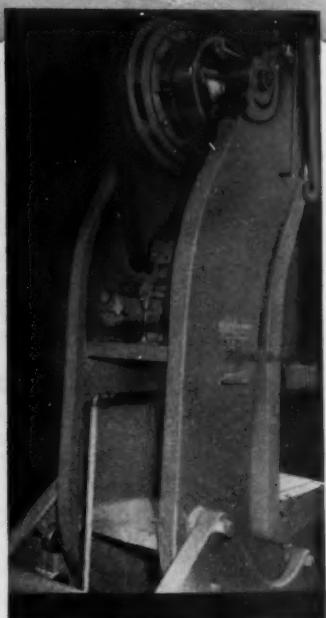
As you can see in the presses shown here, the compact Cleveland Clutch is mounted directly on the driveshaft. Best of all, it's easily installed on new or old presses.

To get more out of your presses, install new Cleveland Drum Type Clutch units. We will gladly send you full specifications, or furnish you with any additional information you may desire on "The Clutch that's revolutionizing press production".

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LABOR: USW to Meet Tough Opposition

Steelworkers map demands, strategy this week . . . Will get cold reception by industry . . . Bargainers expected to turn thumbs down on pay hike, GAW—By J. B. Delaney.

Contract demands formulated this week by the United Steel Workers of America will get a cold reception from the steel industry.

Industry leaders are in no mood to concede anything that will increase labor costs to the point where a compensating price increase would be necessary. They believe market conditions won't support higher prices.

When negotiations get underway within the next 2 weeks, industry bargainers probably will take this position on the principal issues: (1) No wage increase, (2) modest improvements in pensions and social insurance, and (3) no guaranteed annual wage.

Might Be Package

This would be a tough package for Dave McDonald, union president, to swallow. He might be willing to forget about the guaranteed wage but has committed himself strongly with union members for substantial improvements in pensions and insurance. He also will take a stand for a pay boost even if it's only a small one.

Some observers are betting on a final outcome along these lines: wages: 3 to 5 cents an hour; pensions: increase in the present monthly minimum of \$100 to perhaps \$125; social insurance: miscellaneous improvements. A price increase would be certain to follow.

One or more of these issues conceivably could lead to threat of a strike. This might depend on what kind of showing Mr. McDonald feels he must make in his second test as head of the steel union. He

not only has his own membership to worry about but also his standing as a national labor leader.

Industry leaders have made it clear they believe this is the year to call a halt to rising labor costs. They point to slow steel demand and first quarter earnings off 12.9 pct from last year. They believe Mr. McDonald cannot justify substantial demands on the basis of either cost of living or in relation to wages and fringes of workers in other industries.

There is a possibility that industry bargainers might approach the union with this proposition: Accept their proposal of minimum contract improvements for one year, or extend the present agreement as is for 90 days and take the chance that improved market conditions at the end of that period would justify more substan-

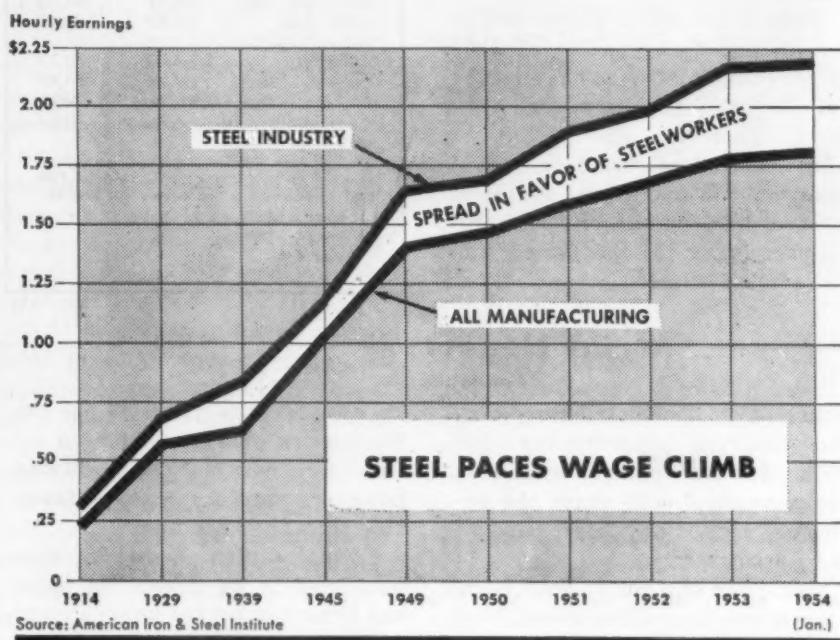
tial concessions. The 90-day period would expire Sept. 30.

Mr. McDonald is painfully aware of curtailed production in the basic steel and fabricating industries. His union recently completed a study indicating 189,000 members are out of work and another 257,000 are on a part-time schedule. This amounts to a large percentage of the union's 1 million members in these fields.

Industry Still Healthy

But whether this would make him modify his demands on the industry is debatable. He says that despite the current recession in steel the industry is still healthy. If the issues came to a showdown Mr. McDonald probably would not hesitate to call a strike.

A possible major obstacle to settlement is the union's position on social insurance. Mr. McDonald believes the industry should bear the entire cost of the program. He will encounter tough opposition on this despite the industry's acqui-



STEEL: Net Dips in First Quarter

Production off 23 pct from first quarter '53 but earnings declined only 12.9 pct . . . Labor, world events, markets will determine the '54 balance sheet—By W. V. Packard.

Although steel production in the first quarter of 1954 was 23 pct less than first quarter of 1953, the industry's earnings declined only 12.9 pct.

The steel profits picture is based on an IRON AGE compilation of earnings statements of 23 companies accounting for more than 83 pct of the industry's ingot capacity.

The 23 companies reported net profits totaling \$123.6 million for the first quarter of 1954, compared with \$142.0 million for the first quarter of 1953, a decline of \$18.4 million.

Doing It Hard Way

On an individual basis operating results of the 23 companies varied widely. Five of the companies actually earned more in first quarter this year than they did in the similar period last year. Those showing a gain are: Jones & Laughlin, Armco Steel, Inland Steel, Harrisburg Steel, and Eastern Stainless Steel. Three companies suffered net operating losses.

Despite the toll of excess profits tax in the first quarter of 1953 (most companies were charged the full 30 pct), earnings were very good. This was due largely to high volume of business. First quarter 1953 operations averaged 100 pct of rated capacity and production index for the period was 140.4 (1947-49=100.)

By contrast, first quarter of 1954 was free of excess profits tax; operations averaged 72.8 pct of rated capacity; and steel production index for the period was 108.1.

In spite of lower sales volume this year, profit margins of most

Steel Company Earnings

	First Quarter 1954	First Quarter 1953
U. S. Steel	\$44,830,376	\$49,375,958
Bethlehem Steel	27,802,938	30,961,033
Republic Steel	11,079,012	13,779,049
Jones & Laughlin	5,821,000a	5,642,000
National	6,420,225	11,084,933
Youngstown Steel & Tube	2,989,478	6,958,975
Armco Steel	9,137,226	7,767,045
Inland Steel	9,463,250b	6,805,150
Colorado Fuel & Iron	771,456	2,177,372
Wheeling Steel	1,135,386	2,962,388
Sharon Steel	70,716	2,051,826
Kaiser Steel	3,828,804c	5,592,091
Crucible Steel	529,926	1,756,829
Pittsburgh Steel	199,150d	1,971,820
Allegheny Ludlum	1,063,000	2,098,000
Northwestern Granite City	748,186	1,344,746
Detroit Steel	237,980d	1,692,546
Alan Wood	183,869	674,347
Copperweld Steel	282,347	994,550
Rotary Electric	516,202	728,857
Continental Steel	318,217	401,213
Harrisburg Steel	563,778	561,073
Acme Steel	644,963	1,420,777
Eastern Stainless Steel	5,264,673	4,701,217
Carpenter Steel	504,340	901,872
Follansbee Steel	184,787d	191,423

a Declining balance method of accelerated depreciation.

b Includes interest received on a refund of federal taxes applicable to 1949 and prior years in the amount of \$712,881.

c Nine months ended Mar. 31 not included in totals.

d Net Loss.

firms held reasonably well. Margins of some firms actually increased. For example, U. S. Steel reported income of \$44.8 million as a return of 5.4 pct on sales in first quarter this year, compared with income of \$49.4 million as a return of 5.3 pct on sales during first quarter of 1953.

Chances are steel earnings for the balance of 1954 will be fully as good as they were during the first quarter. But much depends on (1) outcome of wage negotiations, (2) international events, and (3) market conditions.

A long strike, even if it were to firm the market, would of course be financially disastrous. Although most steel leaders believe there will be no strike this year, such a possibility should not be overlooked.

Strike Can Happen

Steel officials will try mightily to prevent higher wage costs on the grounds that increases are not warranted by economic conditions. And they do not wish to be placed in the position of having to decide whether or not to risk a price increase in a weak market.

Privately it is doubtful that they have changed their historic view that increased (wage) costs require higher prices, but they are not restating that view now.

If they fail to convince union leaders of need for stability in steel, a strike could easily result.

Steel leaders generally reported the order decline has been arrested and that the market has been stabilized. Most of them believe a moderate pickup in business is already underway, but they do not expect a strong spurt in the ingot rate.

Special Report

Continued

escence to a non-contributory pension program following the 1949 strike. The steel companies believe the workers should share the additional cost of any improvements in this program.

Last year the union won wage concessions averaging about 8½¢ an hour. To offset this the indus-

try advanced its prices \$4 per ton. Steel extra charges had been advanced earlier. Market conditions, however, were much more favorable than they are now.

Formal union demands were scheduled to be drawn up today and tomorrow by the union's international executive board and wage

policy committee. The entire contract excepting pensions and insurance expires June 30. But these two issues will be negotiated even though the 5-year pact covering them has until Oct. 31 to run. The union last week notified basic steel firms it wants to negotiate on all phases of the contract.



METAL POWDER: See No Dip for '54

Despite slow start and smaller volume in some uses, total sales are expected to equal 1953 . . . Sales not affected by season . . . Military total down—By K. W. Bennett.

Despite a poor first quarter, powdered metals are expected to equal 1953 sales in 1954. And despite the slow start (as much as 25 pct below the same period last year in some cases), there are those who expect 1954 sales to not only equal last year's tonnage, but outstrip it.

One thing was apparent at last week's meeting of the Metal Powder Assn. at Chicago. Metal powder cannot be expected to follow the rhythmic seasonal pattern of most industry. Last year after July, when most industry was beginning to slow rapidly, powdered metal sales continued to plug sturdily ahead, didn't hit a real low until January, of this year. Tonnages then slid as much as 25 pct, suppliers told THE IRON AGE.

Dies Slowed Early

Opening of second quarter, however, found sales volume again moving up. Fabricators of powdered metal products and the die-makers noticed the slump earlier and believe their pattern duplicated more closely that of the majority of industry.

Suppliers of dies to powdered metal fabricators, for instance, spotted dropping volume in early second half of 1953. November was the estimated low point. In that month, demand began to level again, and by February was again moving up.

Despite the optimism of pro-

ducers of powdered metal, the die-makers are somewhat less hopeful—indicate they'll probably do about 10 pct less sales volume than last year. In January of 1953, for instance, backlogs of orders for dies were running to 5 months. By January of this year the backlog had moved down to 4 or 5 weeks, even less in many cases. Like powdered metal sales, diemakers report their volume is picking up, but do not expect to recapture entirely the loss of second half 1953.

See Continued Rise

Powdered metal is in a healthy situation. Defense work, which has proven a weak reed to a number of industries during 1953, has been reduced a reported 20 pct throughout the industry. Last year, it's estimated, about 30 pct of total output from the powdered metal industry was going into defense contracts. At present, military work is believed to constitute only about 10 pct of total output.

Use of powdered metal is expected to expand during 1954. Metal powders for scarfing, for self-lubricating bearings, gears, and cams, electronic cores and magnets still haven't realized their full potential.

Attracting somewhat more attention at this year's meeting, were possible applications for high density materials. High density iron parts can be produced with a finish in the 8-15 microinch

NEW OFFICIALS of the Metal Powder Assn. include (left to right) R. B. Quelos, B. T. duPont, R. L. Ziegfeld, W. E. Cairnes, G. A. Roberts, and P. E. Weingart.

range, with a tensile strength up to 180,000 psi and impact strengths up to 500 ft-lb per sq in.

Electronic Volume Off

Powdered metals producers are betting on a good year. They have good reason. In 1948, iron powder consumption was running about 12 million lb per month. By 1953, the going monthly rate was in the order of 2,203,000 lb. Copper powder, though still considerably less in tonnage than iron powder, doubled its sales volume over the same period and is now consumed at the average rate of 2 million lb per month.

Lion's share of iron powder goes to bearing and parts manufacturers; principal use of copper powder is for bearings, parts, and friction materials.

A dropoff in television sales and electronics equipment generally is bound to affect iron powder sales, and suppliers to the TV industry are betting on running about 10 pct below last year when 1954's sales are finally totaled.

Another bright spot: Despite sharper seasonal cycles in some industrial lines, powdered metal, on the basis of reports from several producers, seems to continue to move at a fairly even pace throughout the year. Which argues for a nicely balanced customer list, a widespread market for current metal powder productive capacity.

Expansion

Republic's White Plots New Targets

Steel firm to develop Mexican rutile deposits . . . But plans no sponge facilities now . . . Nuclear expert joins staff . . . Enter housing field "indirectly" . . . Sales rate picks up.

Several bombshells fell on lower Manhattan late last week. Occasion was a talk by Republic Steel President Charles M. White to the New York Society of Security Analysts.

A major revelation was Republic's acquisition of what may prove to be the largest deposit of rutile yet discovered in the Western Hemisphere. The titanium-bearing ore is located in the extreme southern part of Mexico, in the Province of Oaxaca about 30 miles from Port Angel. Deposit contains millions of tons of crude ore containing rutile in various degrees of purity.

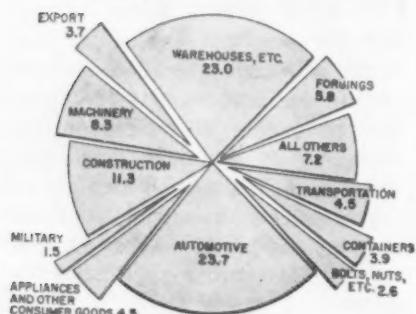
Test drillings and an adit almost 200 ft long indicate the ore is readily mineable by underground methods. Transportation offers no unusual problems. Concentrating operations will be carried out at or near the mine head.

No Sponge Yet

Republic, in cooperation with U. S. Bureau of Mines, has been studying concentrating methods for the past several months, Mr. White reported. Operating problems should be licked within the year. The company expects to develop concentrates of 90 to 95 pct Ti_2 .

Mr. White confirmed that Republic has been melting and rolling titanium for 4 years, but has no facilities for sponge produc-

Republic's Markets



tion. He said that his company has no plans for such facilities in the immediate future, will continue to buy sponge from present producers. Ore may also be offered for sale.

Study Nuclear Uses

But in view of titanium's growth potential and Republic's emergence as a leader in this field, it is not unlikely to suppose that the company will become a basic producer of the metal at some time in the future.

Mr. White also disclosed that Dr. Robert F. Petersen, a nuclear physicist, has joined Republic to study use of nuclear materials in steel production and fabrication.

Dr. Petersen, who is chief of Industrial & Production Reactors Branch, Division of Reactor Development, Atomic Energy Commission, will assume his new duties at Republic July 1.

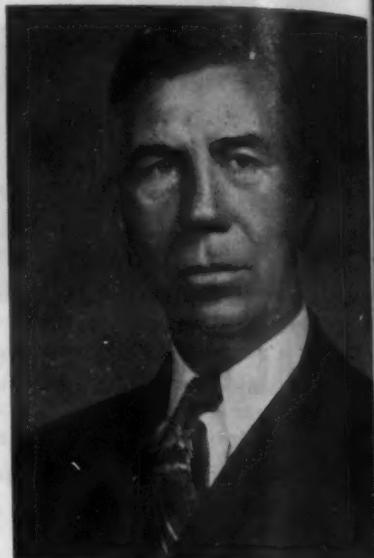
Check Alloy Dispersion

Commenting on his work, Dr. Petersen said: "Steel is one of the great power consuming industries. The development of a nuclear power plant which could support the expanding need for power for the mills and electric furnaces would be a great step in the direction of efficiency and operating economies."

Other possible jobs for nuclear materials in the steel industry mentioned by Dr. Petersen included more economic concentration of low grade ores and use of tracers in studying dispersion of alloying elements in a heat of steel.

"The job is to introduce dollars and cents into the perfection of controlled reactors."

Republic is also planning to enter the housing field "indirectly," Mr. White reported. This does not mean the company will build prefabricated homes, but rather will



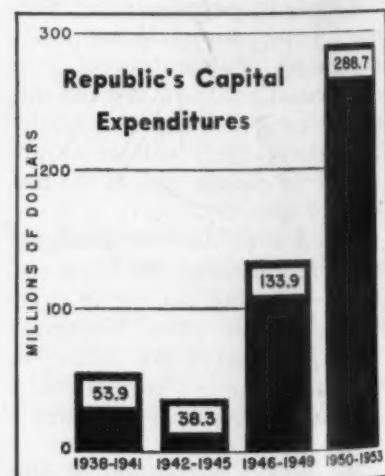
C. M. WHITE, Republic's president outlines diversification plan.

concentrate on supplying steel products used in housing, ranging from Republic's existing line of steel kitchen units to such items as structurals, gutters and downspouts and pipe, etc.

Why Sales Slipped

Overall, Republic's business has turned upward in the second quarter, and general outlook shows steady improvement, Mr. White said. He is confident that steel consumers have reduced inventory in-balance by 50 pct. In the first quarter the company operated at 69.4 pct of ingot capacity, hopes for better performance this period.

Mr. White revealed that his company's current policy is to get as many customers as possible in



selected areas rather than on a geographically hit-or-miss basis to minimize freight absorption. He assigned two major reasons for Republic's relatively weak performance in first quarter:

1. Republic has at present no structural capacity, was hence unable to derive full benefit from current high construction activity.

2. Thirty-five pct of the company's finishing capacity is in bars, which have been very weak.

In addition, Republic has heavy stainless and alloy steel capacity. Demand for both these groups has been down so far this year. But Mr. White emphasized that his firm is currently handling 23 to 24 pct of total U. S. stainless business.

Republic's plastic pipe sales have been holding up very well, Mr. White said. He disclosed that the company is currently engaged in research on plastic coating of steel pipe.

Sheet:

Pittsburgh Steel Co. completes \$65-million expansion



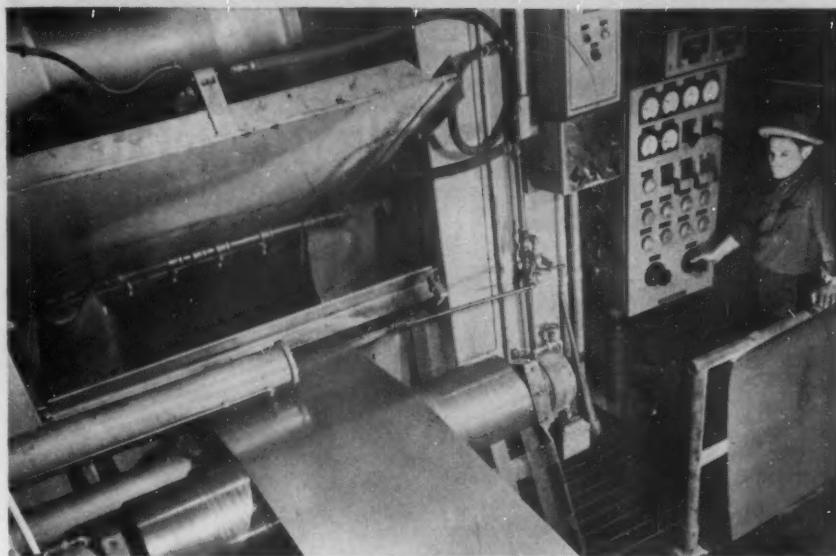
Avery C. Adams,
head of Pittsburgh
Steel.

With formal opening of its new cold-rolled sheet mill at its Allenport, Pa., plant, Pittsburgh Steel Co. completed an expansion program which has raised its total shipment of steel products

from 695,000 net tons in 1950 to present capacity of over 1,100,000 net tons.

Diversification of products was the objective sought by Pittsburgh Steel's president Avery C. Adams who piloted developments which have increased the company's ingot capacity by 48 pct and its finished steel capacity by 82 pct.

Before the start of the expansion program, company's production was a less profitable and



AT PITTSBURGH STEEL x-ray gage checks thickness of steel sheet as it comes off tandem mill at a rate of 40 mph.

harder to market product mix of one-third seamless tube, one-third wire products, and one-third semi-finished steel.

A 12 pct increase in basic pig iron capacity was achieved by rebuilding the No. 3 blast furnace at the company's Monessen, Pa., plant and installing two new turbo blowers to increase air blast.

Next step was the enlargement of the 12 openhearth furnaces at Monessen from 150,000 to 250,000 tons capacity.

A new electrically operated 66-in. high-lift blooming and slabbing mill was installed alongside Monessen's steam driven mill which it will replace.

Enters Sheet Market

Greatest physical changes occurred at Allenport where Pittsburgh Steel's tube mill stood at the outset of expansion. Here, a \$28 million hot mill was completed and went into operation last year. (THE IRON AGE, July 30, 1953, p. 39.)

Company's pride and joy is the four-high, four-stand, 66-in. tandem cold rolling mill. This unit, which may have heaviest housings of any 66-in. mill now in operation, can take coils weighing up to 60,000 lb and send them through the mill at speeds up to 3,170 ft per minute. Electronic controls de-

tect one-half-thousandth variations, correct them automatically in 1/25th of a second.

Result of the completed expansion is that Pittsburgh Steel now produces finished steel products (56 pct sheet, 25 pct tube and 19 pct wire), which can be sold to industries using 45 pct of the countries' total tonnage instead of to a limited group of industries using only 12 pct, as was the case before modernization.

Bethlehem:

Will spend \$20-\$25 million on five projects in 1954.

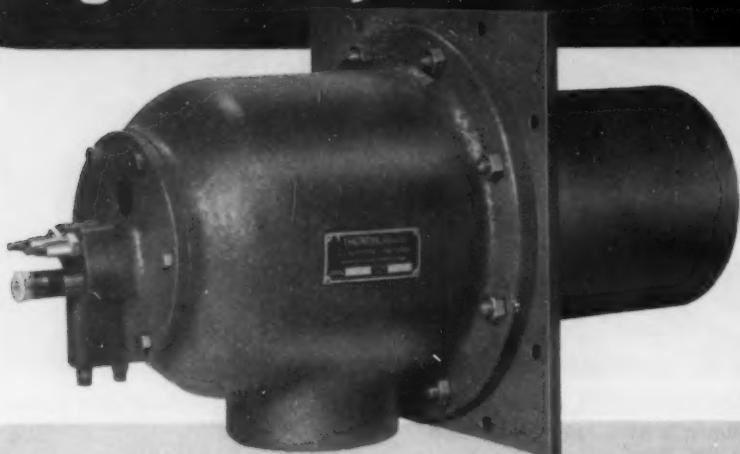
During his press conference in New York, April 29, Eugene Grace, Bethlehem Steel chairman, revealed for the first time five modernization and expansion features in addition to those already authorized. Each will cost in the neighborhood of \$4 to \$5 million.

(1) Approximately \$5½ million expenditure is contemplated at Bethlehem's Sparrows Point plant to provide additional fresh water. Fresh water for this plant is reclaimed from sewage disposal of the City of Baltimore. Water is used only for industrial purposes but is said to be pure enough to drink. Present reclamation provides

UP TO 75% REDUCTION IN EQUIPMENT SIZE

with THERMAL

High Velocity OIL BURNERS

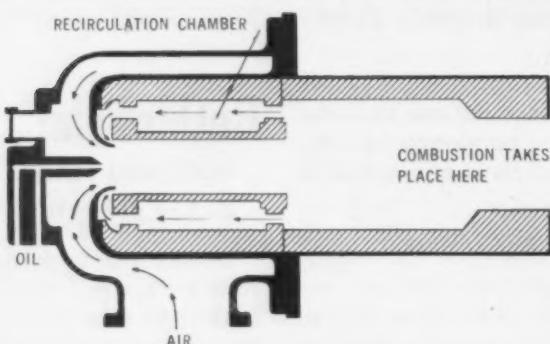


OIL COMPLETELY VAPORIZED WITHIN BURNER

The THERMAL High Velocity Oil Burner employs a unique principle of recirculation of hot gases that vaporizes the oil before it is burned. This results in a short, clear flame and heat release rates up to 10,000,000 btu per hour per cubic foot of combustion space.

By proper utilization of the burner's characteristics of a high velocity, high temperature, non-luminous flame, remarkable results have been obtained in furnaces, kilns, ovens and heat exchange equipment of all types.

For complete information write for Bulletin 103.



THERMAL High Velocity Oil Burners for the distillate oils (thru #3) are available in seven standard models with outputs from 50,000 btu/hr to 4,000,000 btu/hr.

OTHER THERMAL PRODUCTS & SERVICES:
GAS & OIL BURNERS • COMBINATION GAS-OIL BURNERS
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THERMAL
Thermal Research & Engineering Corp.

CONSHOHOCKEN • PENNSYLVANIA

REPRESENTATIVES IN PRINCIPAL CITIES

Expansion

60 million gallons per day. New program will raise this to 150 million gal per day.

(2) Approximately \$4 to \$5 million expenditure is contemplated for a new continuous galvanizing line at Sparrows Point.

(3) A completely new steel fabricating plant is to be built at Los Angeles, Calif. This will replace the existing plant which is to be retired. The ancient existing plant has become surrounded by built-up residential area and is now permitted to operate only one 8-hour shift per day. New plant will be approximately 50 pct bigger than its predecessor and will handle a wider range of material.

(4) Bethlehem plans to erect a new battery of coke ovens at its Steelton, Pa., plant to replace an old battery.

(5) A new rod mill is to be built at the Johnstown, Pa., plant.

All of these improvements are in addition to construction previously authorized. Mr. Grace believes that Bethlehem's capacity, currently rated at 18.5 million tons per year will be approximately 20 million tons by 1955.

Watch for Stolen Metal Powder

Users of hydrogen reduced tungsten metal powder or tungsten oxide should be on the alert for offers of this material from sources other than regular suppliers. It may be stolen goods.

Sylvania Electric Products, Inc., New York, reports a shipment of 8000 lb of hydrogen reduced tungsten metal powder was stolen recently from a trailer while it was parked at a terminal on Central Ave. in Detroit, Mich. The metal powder, valued at \$46,800, was in 80 dark green metal pails.

Shipment originated at Sylvania's Towanda, Pa., plant and was consigned to Allegheny Ludlum Steel Corp., Ferndale, Mich. This information was marked on sealed tags attached to each container.

If you are suspicious of any offers of this material from other than regular suppliers, contact your nearest FBI office.

Thread:

Metalworking, plastics join in making colorful textiles.

Luster of aluminum shines through plastic to lend its sparkle to modern glamor fabrics—in a rainbow of colors. Product that does the trick is a metallic thread made by sandwiching a roll of aluminum foil between layers of acetate film and slitting it down to strip as narrow as 1/120-in. Color is added to the bonding agent.

It sounds simple—but getting the high-quality necessary in the bond is the result of much experimentation, precise control and frequent inspection.

Work in other fields led Acme Backing Corp., Brooklyn, N. Y., one of the major manufacturers of this metallic thread, to start production in 1948. The firm, which markets its thread through a subsidiary, Metlon Corp., gained its initial metal-plastic bonding experience with lead foil for protective packaging material.

And aluminum bonding lessons taught by the thread led back to application of aluminum foil for improved barrier packaging products. These range from heavy duty laminates of acetate, aluminum, cheesecloth and vinyl for the military to brightly colored acetate-aluminum-vinyl wraps for a wide variety of different consumer products.



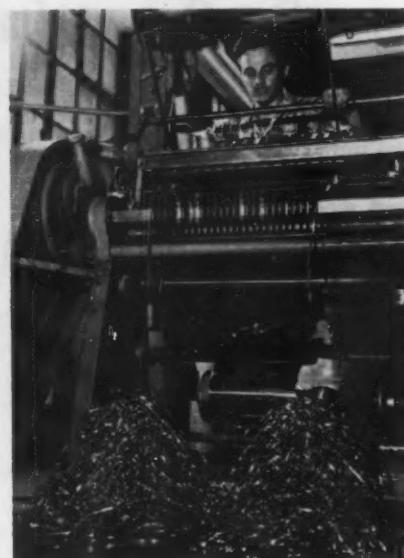
SPLICING aluminum foil and acetate film is first step in lamination. Curing is done in oven at top.



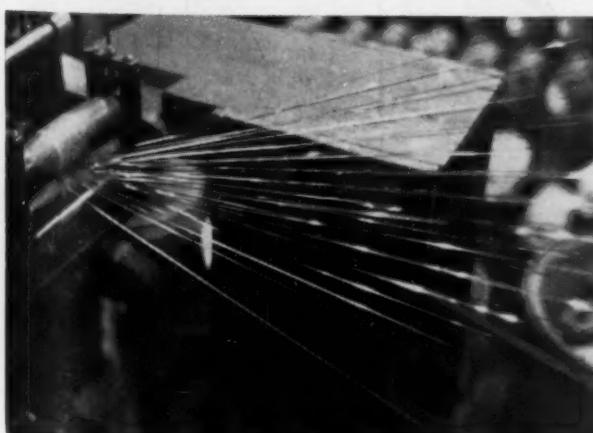
ACETATE is top roll, bottom is laminate. Foil feeds from other end.



INSPECTIONS are frequent as good thread demands perfect bonding.



WEB SLITTING produces $\frac{1}{2}$ to 3-in. strip. Trim is used as excelsior.

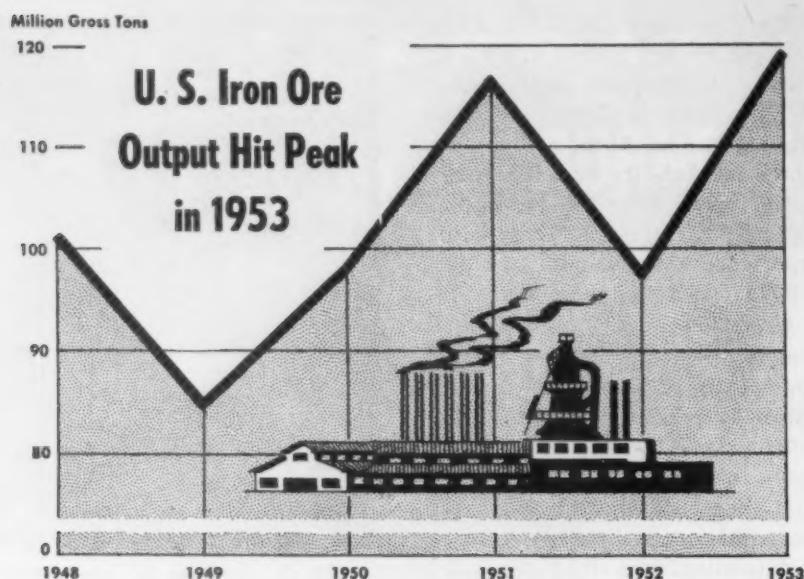


FINAL SLITTING cuts to widths as narrow as 1/120 in.



SLIT YARN is wound on spools or tubes for packing.

Raw Materials



Ore Output, Imports Set Record

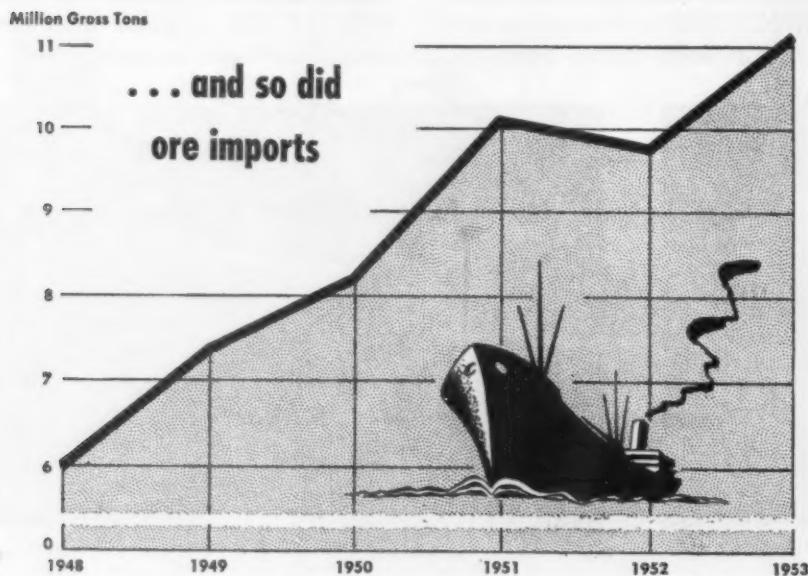
Both domestic production and imports of iron ore into the U. S. set new records in 1953, American Iron & Steel Institute reported last week.

Domestic production was 119.2 million gross tons, about 3 million tons over the previous record set in 1951. Imports totalled 11.1 million gross tons, nearly 1 million tons over the peak reached 2 years ago.

Lake Superior ore accounted for over 80 pct of domestic production, or 96.1 million gross tons.

Largest producers of the 18 states reporting iron ore output in 1953 were Minnesota, Michigan, Alabama, Utah, and New York, in that order.

Imports were received from a total of 19 countries. In five of the top ten, American men and equipment are actively participating. Largest foreign source was Chile, followed by Sweden, Venezuela, Canada and Peru. American firms are assisting in ore developments in all of these countries except Sweden, plus Liberia.



Iron Ore:

J & L to explore Canadian magnetic taconite field.

Plans for exploration and possible development of a large magnetic taconite deposit in northern Ontario are being carried forward by Jones & Laughlin Steel Corp. Tonnage and grade of the ore hasn't yet been determined though estimates run as high as 150 million tons.

Gulf Oil Corp. controls the property in Boston Township 6 miles from Kirkland Lake and has agreed to permit exploration work for 2 years. Further provision is made in the agreement with Jones & Laughlin for leasing the property if results are encouraging. Exploration is expected to begin this year.

Existence of the iron ore body has been known for some time and an airborne magnetometer study a few years ago defined its outlines. Following the survey, the property was staked and mining rights were acquired by Dominion Gulf.

Negotiations between Jones & Laughlin and Gulf have been under way for some time, though a final agreement was held up pending establishment of an economical freight rate structure between the ore body and Pittsburgh. An arrangement has been completed with Ontario Northland, Canadian National, New York Central, and Pittsburgh & Lake Erie railroads, all of which would be involved in any all-rail shipment.

Where J&L Hunts Taconite



Fuel

Titanium:

Electrolytic refining yields high-quality metal in tests.

A low-cost method for producing metallic titanium has been one of the most intensely sought goals in metalworking during recent years. Now Shawinigan Water & Power Co., Montreal, reports it has successfully produced high-quality titanium in the laboratory by an electrolytic process.

The firm has been working on the problem for several years in the laboratories of its subsidiary, Shawinigan Chemicals Ltd., where initial studies were made of the ore used by Quebec Iron & Titanium Co.

More Study Needed

Whether commercial scale operations will be feasible has not yet been determined, though the firm is optimistic. Experimental work will be continued and production on a pilot-plant scale is expected by this June.

It is still too early, according to Shawinigan President J. A. Fuller, to make any cost estimates on commercial production by the method, though substantial savings are anticipated.

No technical details were available at press time other than that production is achieved by electrolyzing a solution of titanium tetrachloride. Patents have been applied for in several countries.

ODM Sets Up Titanium Stock

Wider use of titanium sponge in the manufacture of civilian as well as military products is in the offing. Office of Defense Mobilization has set up a government-financed working inventory (4000 tons to start) of titanium sponge to assure availability of the product to the aircraft industries. Government expects the increased volume of production will pull down the price and result eventually in widespread military and civilian uses. Contracts with titanium sponge producers will be drawn by the General Services Administration.



Silicon-nickel hammer heads hit coal mine seam as . . .

Hammer-Blow Vibrations Mine Coal

U. S. Steel Corp. is using the principle of vibration to mine coal in the Pittsburgh district. The company is operating 40 Konnerth miners and has placed orders for additional machines.

Developed by K. L. Konnerth, vice-president of U. S. Steel's coal operations, the miner knocks down coal through the vibration of two silicon-nickel hammers against the working face. The hammers strike 1800 15-ton blows per minute.

In normal operation, the machine mines and picks up 120 to 250 tons of coal in each mining shift. Coal quality is said to be competitive with that produced by other mechanical miners.

After the coal is knocked down, a conveyor mechanism hauls it through center of the machine to the rear and loads it directly into a shuttle car. Including the conveyor the miner is 30 ft long and weighs 23 tons. It is 54 in. high and 6.5 ft wide, is mounted on caterpillar treads. It will tunnel into coal at 3.5 fpm, moves at 110 fpm in a cleared area. A 70-hp electric motor drives cutter chains, rear conveyor, caterpillar drives and two pumps. A motor generator set operates the hammers.

Before the vibrating hammers go into action twin chain cutters slice two 5-ft horizontal cuts in the mine face close to the floor. The cut is 6 in. wide and as deep as practical. Two other cutters produce vertical cuts in the coal to block out a section to be broken and loaded. A water spray settles dust created by the cutting and hammering.

Report New Titanium Process

The Kroll process has been bypassed in a titanium powder production method developed in Japan, according to Matko Sales Corp., New York, which will import the product.

The process reportedly sidesteps the titanium tetrachloride stage. This is done by direct reduction of titanium dioxide by calcium and magnesium. While no cost figures can be given, it is claimed that this method is cheaper than

the Kroll method now used in the U. S.

Purity runs from 99.3 to 99.7 pct titanium, though no figures are available on percentages of individual impurities such as carbon, oxygen and nitrogen. Powder is described as "very fine" with an average Vickers hardness ranging from 160 to 200.

According to A. A. Matkovsky, the importing firm's president, cold-rolled sheets produced from the powder compare with those produced by other means.



WHERE ANYTHING LESS ISN'T GOOD ENOUGH

...specify a "Shaw-Box" Crane

Proof of the absolute dependability and outstanding economy of "Shaw-Box" Cranes can be found in power stations, railroad shops and thousands of industrial plants all over the country.

"Shaw-Box" produces cranes in the greatest variety of standard types and sizes. When you invest in a "Shaw-Box" Crane today, you get all the advantages of more than 66 years of experience in developing and manufacturing nothing but money-saving load-handling equipment. Many construction and operational features now considered standard in the industry are the product of "years ahead" creative research and engineering within the "Shaw-Box" organization.

"Shaw-Box" Cranes of all capacities — 500 lb. size or 300-ton giant — surpass every requirement in durability, low-cost operation, safety and maintenance convenience. That is why, if you are planning a new plant or the modernization of existing facilities, we invite you to learn how greatly "Shaw-Box" Cranes can contribute in reliable efficiency and constant economy. Write for Catalog 219 showing "Shaw-Box" Full-Electric Traveling Cranes from 5 tons up; Catalog 218 for 'Load Lifter' Cranes from 1 to 25 tons; or Catalog 221 for Series "D" All-Electric 'Load Lifter' Cranes from 1 to 20 tons.



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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Micronen' Industrial Instruments, and Aircraft Products.

Mobilization

Spending:

House unit would cut \$1.2 billion from military budget.

Military funds voted by Congress this year will be far from miserly, though the services may get less new money than was asked for in President Eisenhower's budget request.

Last week, the House was voting on an Appropriations Committee recommendation that the military departments be given nearly \$28.7 billion for fiscal 1955. Amount requested was \$29.9 billion.

Added to the new funds, however, would be some \$48 billion remaining unspent at the end of the present fiscal year. If the Senate fails to restore any of the funds marked for deletion by the House committee, the tidy sum of \$76 billion will still be available after July 1.

What They'd Get

Proposed cuts are: Army, \$595.4 million; Air Force, \$380.6 million; Navy, \$209.1 million; and Marine Corps, \$1.8 million. Cuts for certain joint service operations bring the total reduction to about \$1.2 billion.

Remaining for the Army would be \$7.6 billion, intended to keep 1.3 million men under arms and cover more than \$300 million of research and development.

The Air Force, which Defense Secretary Wilson says made a bad guess and got stuck with more than \$300 million worth of unneeded engines, would receive \$10.8 billion. This money would allow total active planes to be raised to nearly 23,000 by June 30, 1955, and maintain average manpower at 960,000.

Navy would get \$9.7 billion, to be used in operating 1080 ships, constructing a fourth supercarrier and a third atom-powered submarine, and supporting an average manpower of 712,400.

With its recommended \$612 million, the Marine Corps would keep three combat divisions and three full-length air wings.

BRITAIN: Steel Price Rise Coming

Steel mills will be forced to raise prices because of increased coal, pig iron, transportation costs . . . Fear hike may hurt sales . . . Roundup of British steel markets.

Even though they don't want to, British steel mills will soon raise prices.

With the exception of flat products which are still tight in Britain, supply and demand are just about in balance and producers fear a price increase may hurt sales.

Nevertheless, steel mills say they will have to up prices because of: (1) the recent increase in pig iron prices, (2) the new 35¢ per ton surcharge put through by the railroads on coal bought by the iron and steel industry.

In addition, the National Coal Board, faced by a year-end deficit of \$47.6 million plus \$39.3 million lost in previous years, wants more revenue, planned to increase coal

prices 4.8 pct earlier this week.

Just how much the steel price hike will amount to, the British Iron & Steel Board hadn't revealed. The mills don't want it to be any more than is needed to cover additional costs.

Demand Varies

Britain's heavy rolling mills are operating at full capacity, but demand is uneven, causing a squeeze on some items, softness in others. Plates are in strong demand and while production is coming more in line with demand, producers still have heavy backlog.

Sheets, particularly the lighter gages, are still enjoying a boom.

Steel re-rollers, however, have difficulty maintaining a 4-day week

U. K. Steel, Pig Iron Output

Year	Steel (000 net tons)	Pig Iron (000 net tons)
1952	16,388	12,015
1953	19,722	12,516
1954,	5,258	3,318
(First quarter)		

and would particularly like to see increased demand for small angles, flats and rounds.

A considerable amount of development work is going on in England's coal mines which has created demand for heavy steel arches, props, and roofing bars.

On exports there has been little or no improvement in demand for small steel sections, rounds and flats. What orders there are come from European mills.

Pickup is expected, however, because exports have been at a very low level for the last 12 months and British mills believe inventories on the Continent are low.

Turn Page

U. S. Machinery Sent to Red Steel Mill

Until this year Bulgaria was the only Eastern-bloc country which did not have a steel industry. Now it does, thanks largely to machinery supplied by the West, including the U. S.

Production at Bulgaria's Lenin steelworks near Nikolaev began early this year and around 90 pct of the equipment being used is believed to have come from Free World countries.

Much of this machinery is classified as strategic and was, of course, not shipped directly from Western producers to Bulgaria. But as THE IRON AGE has pointed out frequently in the past the Reds have many ingenious methods of circumventing the West's attempts to restrict the roundabout shipment of strategic goods.

U. S. equipment seen in the Bulgarian steelworks include Niles-Bement-Pond forging hammers, Birdsboro Foundry shears.

Two openhearts in the plant are from the West German DEMAG firm, while two more which are under construction, are from Wemmann Smith Oven Engineering Co., England, with parts and accessories coming from Davy & United Engineering Co. Two blast furnaces now being built are from the French UNISOR firm and its branch companies. The Lenin plate and sheet mill came from the French SOLLAC group.

Will Boost Capacity

Other manufacturers' names noted on equipment in the mill: Cleveland Crane & Engineering Co., English Electric, Kahn & Kolb.

When completed next year, the Lenin steelworks will have four openhearts with a combined annual capacity of about 132,000 tons. By 1956 capacity will hit 337,000 tons.

In production right now are two openhearts and rolling mills capable of turning out about 50,000 tons of finished steel annually.

IRON AGE correspondents learned of a similar situation at an underground ordnance plant which is being constructed near the Lenin steelworks. Approximately 60-70 pct of the equipment in the plant comes from the West—America, Germany, England, France, Switzerland.

The plant will be completed in 1955, but production (mostly artillery, munitions, rockets) will start near the end of this year.

Of course, none of the Western companies with the exception of the Swiss have sold equipment directly to Bulgaria. Practically all of it was shipped on the Danube. (A complete account of illegal traffic of strategic goods on the Danube will appear in a forthcoming issue of THE IRON AGE.)

International

Dominion demand for heavy sections and plates has slipped, though Britain naturally gets the lion's share of orders that are placed. There is little delay on shipments.

Ease Import Bans

Britain's foundry industry is not operating at full capacity but business has improved from a year ago.

Many of the engineering and specialty foundries catering to the export market were having difficulty because of import restrictions imposed by other countries. Recent easing of these restrictions has resulted in increased business for Britain's foundries. Demand has been mainly from motor, tractor, farm machinery, machine tool manufacturers.

Light foundries also shared in the pickup in overseas demand as well as from home consumers. However, during the last month orders began to slump again.

Building castings are in fairly brisk demand, and stocks are now being used up more rapidly. Busy home trades such as the coal mines and steelworks continue to place sizable orders for castings.

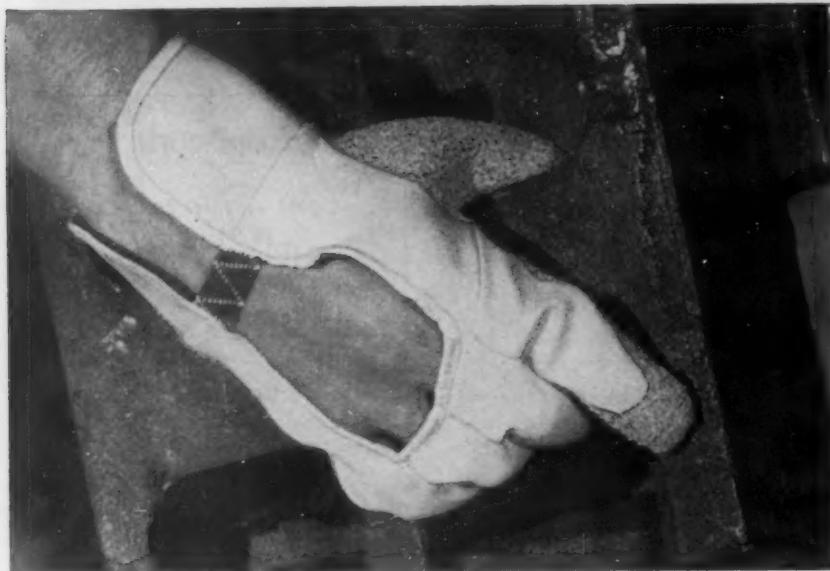
Bids on Czech Steel Mill Start

Bids on the Czech-owned steel mill, stored in this country since its shipment abroad was blocked in 1952, are being examined by Foreign Assets Control section of U. S. Treasury.

By May 18, Treasury must determine whether any of the bids will be accepted. Government can reject all bids.

Highest offer involving the entire range of equipment in the mill was made by Sociedad Mixta Siderurgia, Buenos Aires, Argentina, which offered \$9 million. Lowest of the nine bids amounted to only \$100. Original price of the mill was about \$16 million.

If the Treasury sells any or all of the equipment, proceeds must be deposited in the U. S. banks for the account of the Czechs. This money must remain here while the government considers U. S. claims against Czechoslovakia.



Cool Vent-Back Glove: Palm coated with sure-gripping, long-wearing, rough textured natural rubber.

Costs 40% to 70% less to protect hands with palm-coated gloves

Coated palms outwear canvas or leather palms. Fabric backs give comfortable ventilation.



NEOX No. 363

Handling sharp-edged materials, wet or dry: Palm-coated with NEOX (specially reinforced neoprene) which is unequalled for resistance to cutting and puncturing and does not absorb grease or oil. Job-fitted for handling such materials as strip and sheet metal.



Grappler No. 362

Handling abrasive materials, wet or dry:

This Grappler glove is palm-coated with DUROX, a leather-like plastic that outwears ordinary plastics 50% and retains its grip when wet. Band top and knitwrist styles are also available in regular plastic coating. All Edmont plastic coated gloves have wing thumbs and best fit of any coated work gloves.



Grab-it No. 62-W

Handling sharp, abrasive or slippery materials, non-oily: Grab-it type, palm-coated with rough-textured natural rubber which has remarkable non-slip grip, as well as long-wearing qualities on rough work. Available in knitwrist style, also.

Free Test Offer to Employers: Send brief description of your operation, materials handled and temperature condition. We will recommend the glove (palm-coated or fully coated) that best fits your application, and forward samples free of cost, for testing on-the-job. Our laboratory also develops special gloves for special applications.

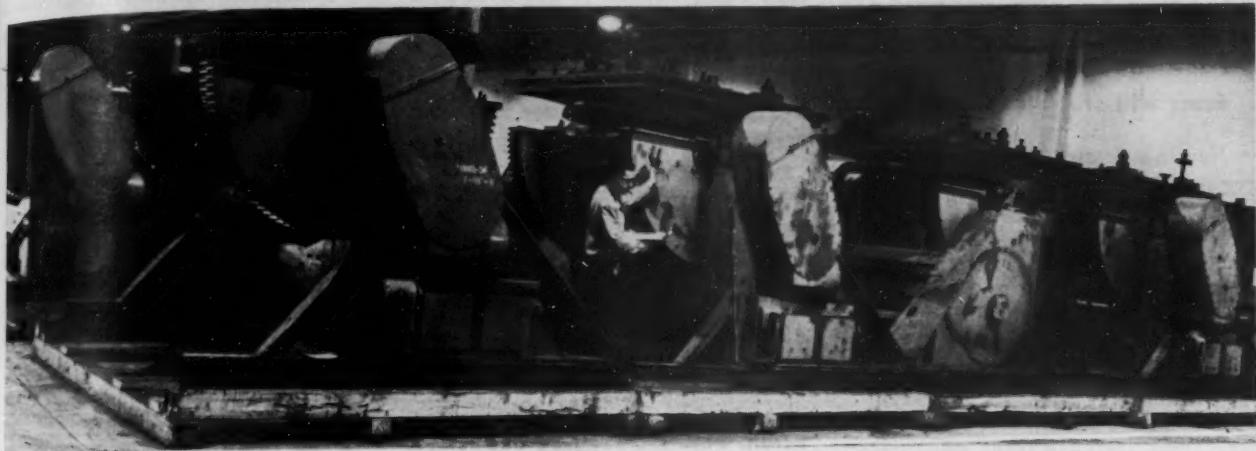
Edmont Manufacturing Company, 1234 Walnut Street, Coshocton, Ohio

*World's largest maker of coated industrial gloves,
available through all leading industrial suppliers.*



Edmont job-fitted gloves

Stockpiling



Tank weldment positioners are inventoried at Livonia as . . .

Ford, Ordnance Mothball Tank Tooling

Layaway program of production tooling could save year in tank production . . . Government stores entire plant's tooling . . . More installations planned—By R. D. Raddant.

Ford Motor Co. and Army Ordnance have cooperated in a layaway program of tank production tooling that could save a full year's production of tanks should an emergency arise.

About \$40 million worth of government-owned tools are now stored in a dehumidified warehouse. It is a stone's throw from the new plant where Ford Tank Div. produced M-48 tanks for 16 months.

The tool layaway program is a new concept of storing intact in a government-owned warehouse the entire tooling of a major defense plant. The realistic program is in direct contrast to the policy at the end of World War II when defense tooling was disposed of in hit-or-miss fashion.

While the Ford program is unique in its own way, Brig. Gen. J. B. Medaris, chief of ordnance, assured THE IRON AGE that "there are plans underway for an equal degree a preservation of tooling" at similar defense plants throughout the country.

The Ford-owned tank plant is already being converted to production of automatic transmissions for Ford cars. Much of the transmission tooling was installed simul-

taneously with the removal of tank production equipment, making it possible for Ford to minimize employee layoffs.

Costs \$185,000

At the layaway warehouse, about 5500 major items of machinery, fixtures, and equipment and some 15,000 additional items of tooling, gages and the like comprise the tank tool package. Equipment is also included from sub-contractors who worked on the tank program.

Storage will cost the government \$185,000 a year, on a year-to-year basis. Expense of moving the tool-

ing amounted to \$2 million and the warehouse itself cost \$1,167,000.

D. S. Harder, Ford's manufacturing manager, lauded the layaway program as a "very intelligent move."

Only a small number of the tools are special tools and Gen. Medaris assured that even general purpose tools "are not to be pilfered for general purposes." He is determined to keep the package intact.

In the dehumidified warehouse, "mothballing" and shrouding of the tools were unnecessary. Highly finished or precision tools and gages were preserved with a hot-dip application of strippable plastic.

"The difference between tool storage and starting from scratch is about a year's production of tanks," Gen. Medaris pointed out. "It must be figured as a very small payment on an insurance policy."



TOOLS get paint touch-up preservative before warehousing.



FORD QUALITY CONTROL and engineering personnel check tools.

Progress Payments:

Pentagon spells out which firms will still get them.

New assurance is given by Defense Dept. that progress payments will continue to be available to firms holding either production or research military contracts.

Responsible and reliable contractors, a new Pentagon directive states, will be eligible to receive such payments, particularly when handling orders requiring long lead time. Defense Dept. considers 6 months or longer as a long lead time.

Examples of contracts which normally would require at least a half-year to fulfill are those involving production of ordnance items, engines, and electrical and electronics equipment.

Generally, progress payments on new orders will seldom exceed 75 pct of total costs, or 90 pct of direct labor and materials costs of work done on undelivered portions of contracts. A company asking for higher percentages than those named will have to show

that other capital is not available and get special approval from the particular military department concerned.

The directive provides standard rates for liquidation of progress payments. For example, the contractor who gets 75 pct of all costs as progress payments will be paid not more than 25 pct of the contract price of items as they are delivered, until the progress payments have been recovered by the purchaser.

Probe Defense Forging Capacity

Task groups representing the two chief branches of the steel forging industry are preparing to begin a study of available capacity to find out if it is sufficient to meet future defense needs.

Advisory committees from the open die press and hammer forging industry and the drop forging industry handed this assignment to the task groups after recent meetings with officials of Business & Defense Services Administration. Discussed at these sessions was the potential production of forgings essential to military manufacture.

Committee spokesmen estimated that die block capacity is large enough to meet foreseeable requirements.

Award 105-MM Shell Contracts

Renewal contracts calling for production of 105-mm shells at a rate of about 165,000 per month will be performed by four companies for Army Ordnance. The 18-month contracts are already in effect for Kelsey Hayes Wheel Co., Jackson, Mich.; Aluminum Specialties Co., Iron Mountain, Mich.; Rheem Mfg. Co., New Orleans; and National Presto Industries, Inc., Eau Claire, Wis. These were the only successful bidders of 26.

Contracts Reported Last Week

Including description, quantity dollar values, contractor and address. Italics indicate small business representatives.

Truck, fire, class 530, 2 1/2 ton, 6 x 6, fire fighting, \$205,044, Coast Apparatus, Inc., Concord, Calif.

Diesel generating unit, 2500 KW, \$282,737, Nordberg Mfg. Co., Milwaukee, Wis.

Shop equipment, mobile, set No. 1 including publications, \$2,312,742, Couse Mfg. Inc., Newark, N. J.

Repair, type 1123, propeller blades, propeller hubs, 950 ea., \$185,000, Curtiss-Wright Corp., Caldwell, N. J.

Cleaners, vacuum IFB, 09-603-53-245, 187 ea., \$75,184, Spencer Turbine Co., Hartford, Conn.

Repair and/or modification type 1123 propeller blades, 1000 ea., \$250,000, Curtiss-Wright Corp., Hartford, Conn.

Additional quantity vehicles, spare parts DA-04-200-ORD-208, \$14,293,535, Food Machinery & Chemical Corp., San Jose, Calif.

Overshipment of 200,000 ea., Fin, 60 MM M2, \$66,000, Columbia Electric Mfg. Co., Spokane, Wash.

Animated panel training aid for R6D-1 aircraft, \$85,415, Technical Training Aids, Inc., Tulsa, Okla.

Facilities for missiles and missile sys. PR 301865 "Q", \$2,462,609, Hughes Act. Co., Div., Culver City, Calif.

Increase of Sp Pts MIPR ORDIR R52-46 "Q", \$750,790, Willys Motors, Inc., Detroit, Mich.

Rectifier, photogrammetric spares and engr & maint data, 35 ea., \$612,882, Bausch & Lomb Optical Co., Rochester, N. Y.

Generator, 681 ea., \$662,357, Westinghouse Electric Corp., Dayton, Ohio.

Trainer, flexible gunnery, 22 ea., \$87,615, Link Avia., Inc., Binghamton, N. Y.

Wheel assys, Brake assys, 320 ea., \$92,965, Goodyear Tire & Rubber Co., Akron, Ohio.

Voltage regulators, 543 ea., \$92,965, Westinghouse Electric Corp., Dayton, Ohio.

Fuze, PD, M52A2, MPTS, 13750 units, \$250,000, L. E. Mason Co., Hyde Park, Mass.

Fire control elements for T48 tank, \$16,525,074, Chrysler Corp., Detroit, Mich.

"Potted" tube, Image converter, N/A \$274,471, Radio Corp. of America, Harrison, N. J.

Diesel generator unit 100 KW, 45, \$662,438, Cummins Engine Co., Inc., Columbus, Ind.

Tube type 4-65A, 3900, \$58,500, Eltel McCullough, Inc., San Bruno, Calif.

Tube type QK-241, 90, \$156,345, Raytheon Mfg. Co., Waltham, Mass.

Suppressor, electrical noise, 4000, \$115,760, Hopkins Engineering Co., Altadena, Calif.

IRON & STEEL: March Output By Districts

As Reported to the American Iron and Steel Institute

DISTRICTS	BLAST FURNACE NET TONS	PIG IRON		FERROMANG. & SPIEGEL		TOTAL			
		Annual Capacity	March	Year to Date	March	Year to Date	March	Year to Date	Pct of Capacity
Eastern	17,261,850	1,058,943	3,329,307	24,117	58,341	1,093,060	3,388,848	73.8	79.6
Pitts.-Yngstn.	29,501,270	1,692,171	5,176,960	23,406	61,976	1,715,577	5,238,836	68.4	72.0
Cleve.-Detroit	8,714,680	470,032	1,501,032			470,452	1,501,032	63.5	69.8
Chicago	18,371,250	1,055,630	3,257,454			1,053,638	3,257,454	75.7	80.7
Southern	6,273,080	436,304	1,291,822	4,633	25,158	440,937	1,316,978	82.7	85.1
Western	3,879,260	195,639	648,322			195,639	648,322	59.4	67.6
TOTAL	82,001,390	4,907,147	15,202,897	52,156	146,473	4,950,303	15,349,370	71.2	75.9

DISTRICTS	STEEL NET TONS	TOTAL STEEL*				ALLOY STEEL		
		Annual Capacity	March	Year to Date	Pct of Capacity		Index**	March
					March	Year to Date		
Eastern	25,846,060	1,474,363	4,530,761	67.1	71.0	103.3	112.5	83,014
Pitts.-Yngstn.	44,348,060	2,576,402	7,905,197	68.4	72.3	90.9	96.0	341,729
Cleve.-Detroit	12,791,780	625,564	2,095,394	57.7	66.4	102.5	118.0	59,789
Chicago	27,371,700	1,724,351	5,133,894	74.1	76.0	110.8	113.6	103,768
Southern	6,932,340	482,149	1,386,273	78.5	81.1	132.6	137.0	8,038
Western	7,022,470	425,771	1,272,814	71.4	73.5	113.2	116.5	6,797
TOTAL	124,330,410	7,289,600	22,324,323	69.0	72.6	102.5	108.1	503,135
								1,775,062

* Includes Alloy Steel.

** Based on average production of the 3 years 1947 through 1949 as 100.

REPORT TO MANAGEMENT ..

There'll be
more out of
work

Watch for a sharp rise in unemployment next month. Government's March estimate placed jobless total at 3.725 million, but you can be certain the June figure will top 4 million, may near 4.5 million.

Don't let anyone talk you into believing this means the recession is deepening. Reason for the June unemployment increase will, of course, be the addition to the labor force of almost all of the 1.5 million high school and college students that will graduate next month.

Even in lush '53 when job prospects were considerably better than they are now, June unemployment rose more than a quarter of a million from the preceding month.

Don't let them
fool you

Increase in the June jobless will be a normal, seasonal trend. But this year with government, labor, industry, politicians, businessmen and economic experts all pulse-taking the economy, there will be some who will try to use June unemployment figures to prove business is getting worse. Just don't believe them. There are too many signs the economy's recovering from its recession shakes.

New market
for your firm

Maybe New England hasn't been a prime market for your firm in the past. Perhaps you're writing it off completely because of the decline of the area's soft goods industries. If you are--don't.

Trend of durable goods manufacturers (especially electronic, transportation equipment, aircraft engine, and machine tool manufacturers) to move into New England has already started, will get stronger. Main reason is availability of highly skilled labor.

This industrial shift is causing some momentary discomfort, but long term view is New England will be stronger industrially, and will provide a better market. There's no doubt wage rates in durable goods industries are higher than in soft goods. This means per capita income will rise; New Englanders will have more cash to spend.

Profit sharing
may pay

Your firm may soon find it advisable to put in an employee profit sharing plan. Benefit would be from a tax angle if for no other reason.

Two bills recently introduced in the House (H.R. 8588, H.R. 8690) would allow employers to take an additional tax deduction of 25 pct of the amount given employees through the profit sharing plan. This means a total tax deduction for your company of \$1.25 for every \$1 distributed to employees.

The new bills would also give employees a tax break. It would permit them to exclude 25 pct of their profit sharing take from their federal income tax computations.

Industrial Briefs

Open House . . . TENNEY ENGINEERING, INC. held an open house at its new plant at 1090 Springfield Rd., Union, N. J., for more than 1000 customers, suppliers and friends.

Signs Lease . . . PRATT & WHITNEY AIRCRAFT, East Hartford, Conn., has signed a lease for a 97,000-sq ft building to be constructed in South Windsor, Conn. It is an expansion of the company's present facilities used for work on development of an atomic aircraft engine.

Elbow Room . . . CHASE BRASS & COPPER CO., INC., subsidiary of Kennecott Copper Corp., plans a \$4



NEW PRESIDENT of U. S. Chamber of Commerce Clem D. Johnston, Roanoke, Va., accepts gavel from retiring President Richard L. Bowditch.

million expansion of plant and manufacturing facilities at its Cleveland Babbitt Road Plant.

Joins Staff . . . William J. Bulman has joined the staff of the NATIONAL FOUNDRY ASSN., Chicago, as assistant to the executive secretary.

Gets Order . . . UNITED ENGINEERING & FOUNDRY CO., Pittsburgh has received an order from Compagnie Des Fer Blancs et Toles a Froid (FERBLATIL) located at Tilleur, Belgium, for a 42" wide 4-high reversing cold mill complete with auxiliary equipment.

Safety First . . . REPUBLIC STEEL CORP.'s Troy, N. Y., plant won the National Safety Council award of merit for its safety record.

Honored . . . ARMCO STEEL CORP.'s B. P. Finkbone, product engineer, Research Div., received the fifth annual merit award of the Galvanizer's Committee of the American Zinc Institute at its annual meeting in St. Louis last month.

Summer Jobs . . . AMERICAN SOCIETY FOR METALS has published a list of summer jobs for engineering and other technical students in U. S. engineering schools.

Organizes Firm . . . ECONOMY STEEL SERVICE CO., 1832 West Irving Park Blvd., Chicago, has been organized to specialize in the sale and precision processing of sheet mill and precision strip mill coiled steel. Jack Spear organized the new firm.

Construction Plans . . . CATER-PILLAR TRACTOR CO., Peoria, Ill., plans construction of a new building to furnish improved office facilities for its engine division.

Builds Factory . . . FOXBORO CO., will build a new branch factory at 399 Preda St., San Leandro, Calif. to be completed by Aug. 15.

Available . . . ANSUL CHEMICAL CO., Marinette, Wis., offers a fire testing service to any plant that has a special fire hazard, especially those involving volatile chemicals, plastics, gases, metals or other substances.

Congrats . . . SMITH & CAFFREY CO., Syracuse, N. Y., is celebrating its 60th Anniversary this year.

Awarded . . . WESTINGHOUSE ELECTRIC CORP.'s, Ralph E. Marbury, received a \$5000 "outstanding invention" award for developing a way to "detour" excessive current due to lightning or other causes of short circuits on electric power lines.

Going Up . . . BORG-WARNER CORP., Chicago, plans to build a new 80,000-sq-ft plant for the manufacture of automotive radiators at Oakville, Ontario.

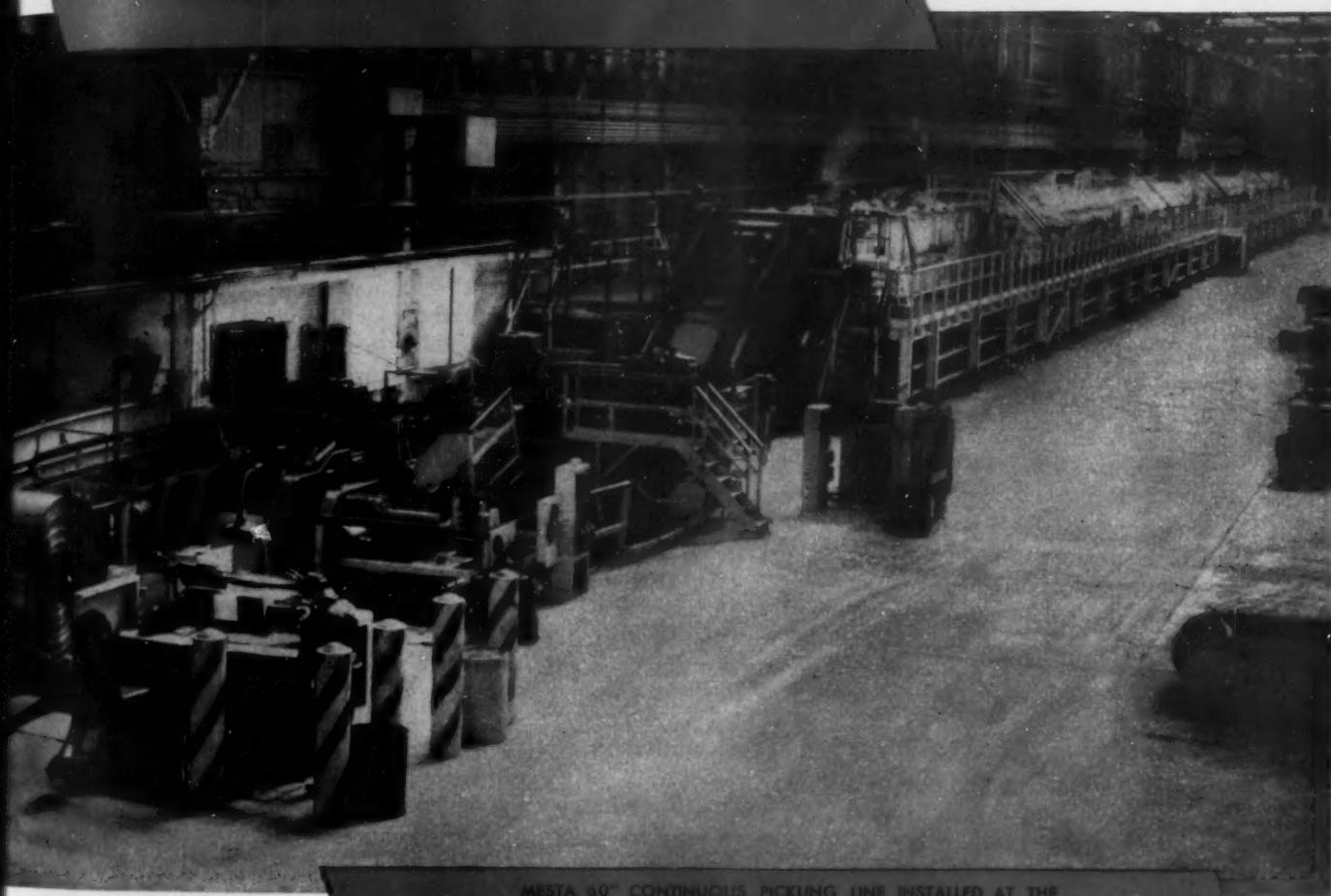
Appointed . . . GRAY IRON FOUNDERS' SOCIETY has appointed Charles F. Walton, professor of metallurgy, Case Institute of Technology, Cleveland, technical director of the society.

Hear Ye . . . AMERICAN CAR & FOUNDRY CO. has contracted to purchase the W-K-M Co., Houston, Tex., manufacturer of high pressure steel valves for oil field and pipeline equipment.

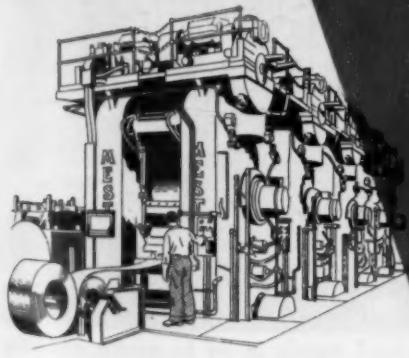
Major Project . . . WORTHINGTON CORP., Harrison, N. J., shipped the first units of a \$2.1 million order for heavy-duty water pumping equipment for use in a major irrigation project in Israel.

MESTA

HIGH-SPEED CONTINUOUS PICKLING LINES



MESTA 60" CONTINUOUS PICKLING LINE INSTALLED AT THE
INDIANA HARBOR WORKS OF THE INLAND STEEL COMPANY



AFTER PICKLING, COILS OF STRIP STEEL ARE COLD
ROLLED ON A MESTA HIGH-SPEED TANDEM COLD MILL

Designers and Builders of Complete Steel Plants

MESTA
MACHINE COMPANY
Pittsburgh, Pa.

The Automotive Assembly Line



American Unified on Unitized Body

Nash, Hudson both use stressed body, no frame . . . Principle has pros, cons . . . Good welding is key . . . Rumors say two GM divisions may switch to unit body—By R. D. Raddant.

One of the underlying factors of the Nash-Hudson merger is a unitized type of body structure shared by the automaking divisions of the new American Motors Co. In Nash it is the Airflyte body, in Hudson the Monobilt Body-and-Frame.

Body construction similarity points to obvious savings through common subassemblies. As the developments of the merger evolve, this is expected to be a major point of focus in cutting costs and improving methods.

What Is It? . . . In brief, the unitized body means elimination of the frame and stressing the body itself for the load-carrying. Body is strengthened by box-like inner structures, making it a major structural member, instead of—a box bolted to a frame.

Hudson and Nash bodies are not exactly the same in principle. In the Hudson a frame is welded into the body and the front section is bolted on. In the Nash the unitized principle is carried throughout.

Saves Weight . . . Immediate advantage is lighter weight, largely from the absence of the frame.

While part of this saving must be put back into the body in extra stressing—added brackets and the like—Nash engineers estimate that about 60 pct of the frame weight can be eliminated. As performance and economy become more important in auto development, weight saving takes on increased significance.

This construction has both assets and liabilities. A unitized body can be built as low as desired, as exemplified in Hudson's Step Down design.

Pros and Cons . . . Furthermore, the frame is expensive and many a manufacturer has been crippled

CUTAWAY of Nash's new English-built Metropolitan shows unit construction adapted to a small car. Many of Europe's automakers use this method.

in design because tooling for a new frame was too expensive.

On the other hand, because of the more complex stressed parts, it costs more to make facelifting changes on a unitized body. There is little, if any, saving on assembly costs.

One trouble spot faced by Nash is changing to the wrap-around windshield because of the absence of a rigid front corner post. Regardless of all claims, the wrap-around styling results in a less rigid windshield section. This is illustrated by the windshield cracking troubles that emerged with the wrap-around models this year until the knack of installation was perfected. However, Nash men contend they have the solution and it will probably result in a different structural approach altogether with the door line cut entirely unlike GM's cars this year.

Claim It's Safer . . . Safety is another factor. Nash people point out that the strength is not concentrated in a heavy frame, but in the stressed structural parts throughout.

Noise was beaten by sound deadeners and rubber insulation. Squeaks were not significant be-



UNITIZED BODY of Nash sedan is held tightly in jig to assure accuracy of more than 8500 spot welds and 210 in. of arc welding used to join parts.

cause of the all-welded construction.

In the early years, repair bills were said to be excessive, but later study indicates that the stressed body units had a tendency to localize body damage. Corrosion—also an early drawback—was licked by complete bonderizing.

Assembly Differs . . . The unitized body has resulted in a radical approach to assembly. Front suspension, steering gear, clutch and brake pedals, handbrake, instruments and controls, rear springs and many other units are all assembled to the body in sub-assemblies. These are all mounted on the chassis in conventional assembly.

The 8500 spot welds and 210 in. of arc welding on each car have prompted Nash to develop highly automatic welding techniques. Successful welding is the key to a successful body.

Nash introduced the unitized body in 1941, extended it to all lines in 1949. It was adapted to the Rambler and to the new Metropolitan. The other most recent car, the Willys, also used the unitized principle.

Whether other divisions of the Big Three will go over to it is anybody's guess. There are rumors, particularly involving two General Motors divisions. But all American Motors cars will be unitized, George Mason will see to that.

Ford, Chevvy Sportster Race On

While Ford is rushing its "personal" car, the Thunderbird, for a late summer or early fall introduction, Chevrolet is not standing still with the Corvette, chief target of Ford's invasion of the sports car field.

Tangible advances are a second color, a metallic blue, to augment the original white, and a removable plexiglass top, which was created as much as a protection from curious sports car fans as from the elements.

The second color only hints at the work Chevrolet has done in de-

veloping suitable and satisfactory colors and painting methods for the plastic body. The first six Corvettes produced, for example, represented six different types of paint.

Rumors persist that the Corvette production may be shifted from plastic to steel bodies. In spite of matched metal dies and other advances Chevrolet has made in plastic production, it could never match the steel-bodied Thunderbird in a production race.

If Chevrolet did go back to steel bodies, it would be a great loss to the industry. As a working plastic laboratory, the Corvette has already made great contributions and can make many more.

Need Funds for Auto Probe

Congress will have to provide the funds if Federal Trade Commission is ordered to make a full-scale investigation of the auto industry. Rep. Shepard J. Crumpacker, R., Ind., recently called for the inquiry to find if the biggest auto producers are trying to drive smaller companies out of business.

THE BULL OF THE WOODS

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
May 1, 1954..	133,948*	23,762*
Apr. 24, 1954..	131,334	24,189
May 2, 1953..	159,945	34,665
Apr. 25, 1953..	151,028	33,772

*Estimated. Source: Ward's Reports

New Transmission Set for Lincoln

It has now been confirmed that a new transmission will be tooled up for Lincoln for 1955 models. Production will be in the new Ford Motor Co. transmission plant which formerly housed the short-lived M-48 tank production.

Lincoln has used GM's Hydramatic transmission and was one of the customer victims of the now historic Detroit Transmission fire.

Ford and Mercury both use Borg-Warner automatic transmissions. They are produced by both Ford and BW roughly on a 50-50 basis. Ford officials say that no change in this relationship with BW is contemplated.

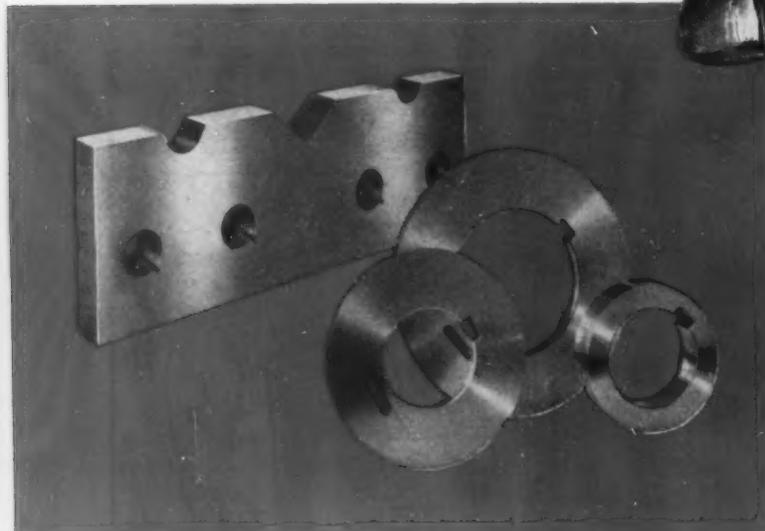
By J. R. Williams



*built for
rugged
action*

**Heppenstall
SHEAR KNIVES**

durable blades for industry



Many leading plants make Heppenstall their standard specification for shear knives. Heppenstall's record for durability provides such production advantages as:

- **MORE CUTS BETWEEN GRINDS**
- **MORE UNITS PER BLADE**
- **LOWER OVERALL BLADE COST**
- **INCREASES IN PRODUCTION**

The reasons may be found in Heppenstall's high standards for the development and manufacture of shear knives. Made from high quality, electric induction steels, these long-lasting knives are famous wherever hot and cold, ferrous and non-ferrous metals are cut and sheared.

Make Heppenstall *your* standard specifications.



Heppenstall

The most dependable name in forgings
PITTSBURGH 1, PENNSYLVANIA

Sales offices in principal cities

This Week in Washington

Consumer Buying Trends Upward

Buying rise is spotty so far but Administration is optimistic on outlook . . . Appliances, autos are brightest spots . . . Tax cuts help . . . Employment rising—By G. H. Baker.

The pattern of consumer buying in the months immediately ahead shows signs of a few more ups and downs and then a definite long-pull turn upward.

Marketing experts and Administration officials alike view the overall outlook as encouraging. Reports from wholesalers and retailers show both healthy and indifferent sales records, and this is a clear sign that sales are emerging here and there from the slump that began last fall.

Plow Back Tax Savings . . . The brightest spots in the consumer buying picture over the nation are in the upturn in purchases of appliances and automobiles, and in building activity. Employment is definitely on the rise. Good results from the excise tax cuts that became effective on Apr. 1 are beginning to show up. In most cases, tax savings are being passed on to the consumer, and he in turn is plowing the difference right back into the channels of trade.

Look for a substantial pick-up in sales within the next few weeks. A surge of spending later this year could help offset the lower sales volume of the early months of 1954.

May Okay Business Census . . . Fresh distribution and marketing data again will be available to business executives late next year, if Congress gives the nod to joint industry-government plans for a new census of manufactures.

Data-gathering plans backed by business leaders and by Secretary of Commerce Sinclair Weeks call for a modest appropriation of \$3.8 million (earlier requests were for more than twice this amount) for the tally on manufacturing activi-

ties to be taken early in 1955 on the basis of 1954 operations. Several members of the Senate and House Appropriations Committees have hinted they are ready to change their minds and vote for the requested funds.

The shift from military output to civilian production, especially prevalent among smaller firms, has been a subject of speculation since the Korean war ended. The answers to this and related questions are to be unveiled when results of the new census are announced.

Seek Aid for States . . . Federal assistance to states investigating illegal and improper claims for unemployment insurance payments may be boosted soon.

Close Texas City Smelter

As far as President Eisenhower is concerned, there is no basis of need for continued operation of the government-owned tin smelter at Texas City, Tex. The Texas delegation in Congress wants to stall off the proposed shutdown on June 30. Administration's position is that there's plenty of tin for every company today plus a government stockpile equivalent to at least 6 years' needs, and continued operation of the smelter would be pure waste at this time. Threatened loss of tin mines in Indo-China could possibly result in a change in Mr. Eisenhower's position.

Most states, U. S. Labor Dept. says, are making sample surveys to get at the source of these claims, which total millions of dollars. To aid in the work of recovering money going to unauthorized claimants, the Administration has asked Congress for \$2.5 million,



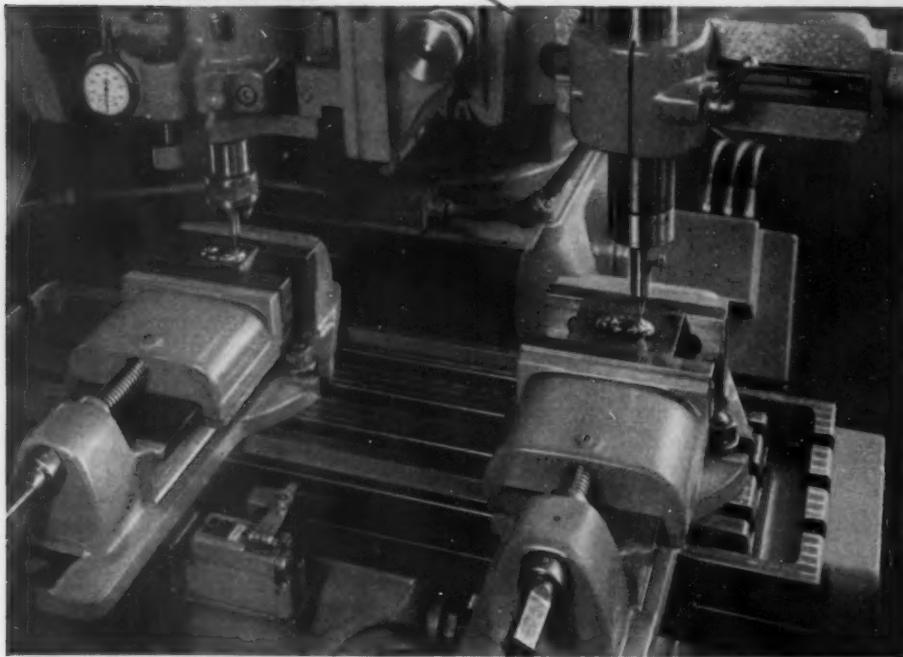
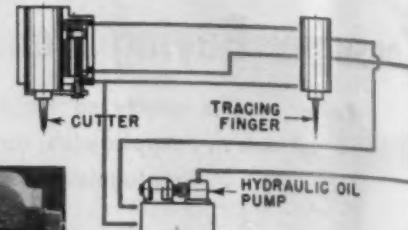
DEFENSE DEPARTMENT Asst. Secretary H. Struve Hensel, left, swears in Wilber M. Brucker as Defense Dept. General Counsel. Secretary Wilson looks on.

Automatic Sculpturing



Woman's head hob

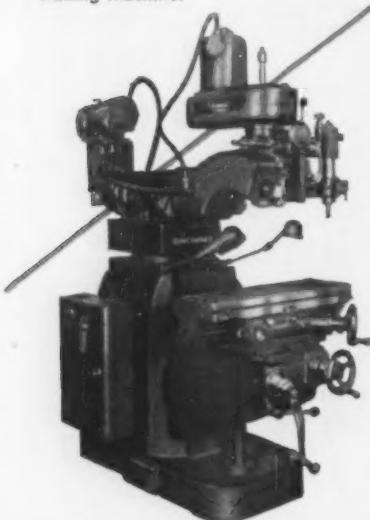
Expertly sculptured in metal by the deft touch of the tracing finger on a CINCINNATI 8" x 18" Tool and Die Miller.



Fine details in master of woman's head are captured in the hob by the Automatic Hydraulic Depth Control Unit on this CINCINNATI 8" x 18" Tool and Die Milling Machine.



Toy horse hob



CINCINNATI 8" x 18" Tool and Die Milling Machine. Complete specifications may be obtained by writing for catalog No. M-1731.

Have you ever tried sculpturing? It's slow, tedious work, and a slight miscue near the finish can spoil days or weeks of painstaking labor. "Sculptors" of metal—America's diemakers—have the same regard and pride for their work as sculptors in stone. But they have one big advantage over their more arty brethren . . . they can employ automatic tracing over a master to reproduce minute details much faster and more accurately than could ever be done manually. CINCINNATI 8" x 18" Tool and Die Millers are equipped for this type of work; automatic, sensitive tracing through the Automatic Hydraulic Depth Control Unit. There's no chance for a miscue at any time, not even if the cutter breaks. The operator merely rotates the table or cross traverse handwheel, while the automatic unit takes care of the vertical movement of the cutter to form the die cavity or profile. These efficient diemaking machines give you two worth-while secondary advantages; accuracy of reproduction and quality of finish are so good that subsequent hand finishing is cut way down. Does the CINCINNATI 8" x 18" Tool and Die Miller sound like a candidate for the first team in your shop? These machines are your best buy for producing accurate, low-cost molds, hobs and dies, from the size of those illustrated here to larger ones up to an area of 8" x 18". Catalog No. M-1731 gives you a better indication of their possibilities. Brief specs. in Sweet's Machine Tool Catalog.

**THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO**



CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

most of which would be placed in state hands.

Costs \$22 Million Yearly . . . Newly-disclosed testimony given to a House subcommittee earlier this year by Labor's Robert C. Goodwin, director of the Bureau of Employment Security, reveals that the government doesn't know just how much money may be lost each year because of claims incorrectly or fraudulently filed.

Mr. Goodwin estimated that it might be in the neighborhood of \$22 million annually. But he pointed out that his information was insufficient to give an entirely reliable figure.

Last year, according to the official, "known improper payments reported by the states was \$6.6 million, involving 145,732 cases." Included were 39,473 fraudulent claims for nearly \$3 million.

Not all can be considered lost, however. The amount of recovery by the states may run as high as 70 pct.

Who Makes Choice? . . . The refrigerator industry, and not the Federal Government, is the proper body to decide whether or not new refrigerators should be equipped with interior latches. This is the view of the U. S. Commerce Dept. on legislation now pending in the Senate which requires inside latches on all new refrigerators.

Secretary of Commerce Sinclair Weeks points out that the refrigerator industry is constantly seeking ways to improve its products. The industry is highly competitive. If inside latches are necessary or desirable, the manufacturers will install them.

But he points out that the children who have suffocated in refrigerators have perished in old, discarded models and not in refrigerators in use. As a result, if "doorknobs" were put on tomorrow, it would be about 15 to 20 years before the inside-latch models began to turn up on the junkpile—which is where the kids manage to lock themselves in.

Opinions:

New England businessmen make their feelings known.

How do businessmen feel about current legislative issues? Seeking an answer to this for at least its own area, New England Council surveyed about 800 Yankee executives and got these varying opinions on important matters:

Keep the fiscal '55 deficit to a minimum (702 to 14) and don't cut taxes beyond the President's budget message recommendations (399 to 85). Cut double taxation on dividends (562 to 71) and do not lift the personal income tax exemption to \$700 (290 to 192).

U. S. should help build the St. Lawrence Seaway (481 to 228). Federal government should not subsidize the merchant marine (333 to 298).

On labor, do not establish a \$1 per hour national minimum wage to cut North-South differentials (412 to 313). Extend Social Security (456 to 277). Strengthen secondary boycott provisions of the Taft-Hartley Law (589 to 47) and give back to states authority to regulate labor-management relations (479 to 183).

Do not abandon farm price supports (325 to 192) but don't hold them at 90 pct of parity (540 to 27).

Instead, adopt flexible supports ranging from 75 to 90 pct (397 to 137) and let farm products seek their own levels, making compensatory payments to farmers when prices drop below predetermined percentage of parity (253 to 218).

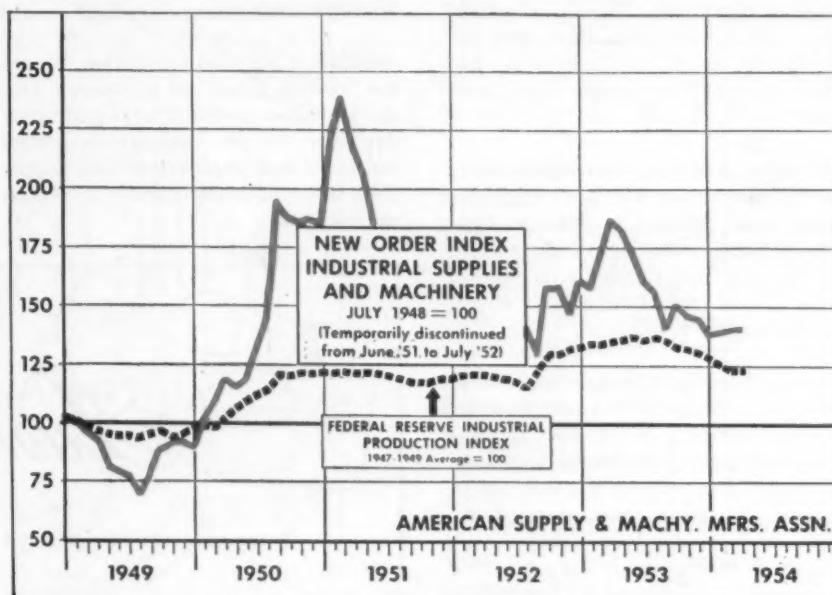
Granting the President broader powers to reduce tariffs gradually on a careful step-by-step basis would be beneficial to New England (399 to 230). But this would not be beneficial to their own businesses (201 to 136) and in many cases would be harmful (155 to 118).

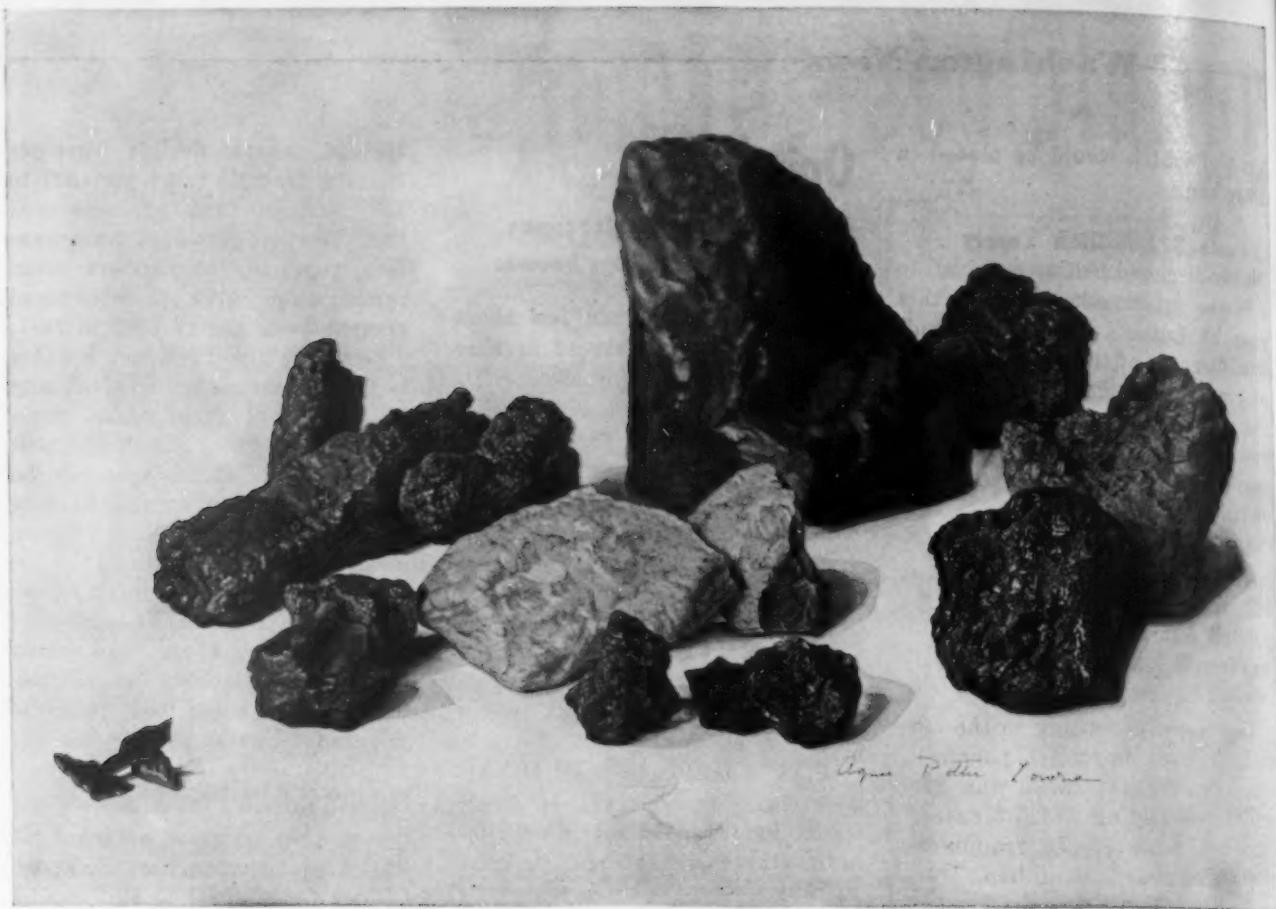
The U. S. has been fair to New England in awarding defense contracts (398 to 184). They voted against "the methods used in the more widely publicized Congressional investigations" (526 to 189).

Publish Health Plan Study

Long-time interest of management and labor in the health of company employees is outlined in a new publication prepared by Public Health Service, U. S. Health, Education, & Welfare Dept.

This five-section report, *Management and Union Health and Medical Programs*, describes the growth of employee medical plans in industry, health protection for working groups, and management-labor contracts providing for benefits to injured or sick employees.





"Fuel for the Furnaces" by Agnes Potter Lowrie, famed artist daughter of a noted steelmaker. In this first of a specially commissioned fine arts series, Mrs. Lowrie finds beauty in weathered iron ore, creamy limestone, shaggy coke — basic elements so common most steelmen take them for granted. Limited edition of 15 x 18 color prints available. Complimentary copy sent upon request.

The Fine Art of Steel Making I

For 60 years the history of American industry has been the story of steel. You know the landmarks. The old, slow hand mill. Table trains with their lusty offspring, the continuous strip mill. And more recently, the speedy, almost automatic four-high mill.

During these 60 years every forward step in steel production has been paralleled by an equal advance in Ironsides Gear Shield lubricants. Heavy duty Gear Shield, once hand-paddled onto exposed gears, is now formulated with a solvent for quick spray application.

With increased use of encased gears, Gear Shield was produced in liquid form for pouring, pumping or timed-jet application. As pressure on production increased, Ironsides was among the leaders in developing extreme pressure lubricants.

Today, so widespread is the acceptance of Ironsides lubricants that other makers

often refer to their own products as "gear shields", even though Gear Shield is an Ironsides trade mark.

Ironsides is not mass production. We are the "custom tailors" of lubrication. Our special position is due in large part to our flexibility. We can—and do—formulate for individual applications and supply these formulas in any quantity from pails to tank cars.

We like tough problems, and we've solved a lot of them. For example, Palmoshield, replacement for palm oil and most important advance in lubrication since World War II.

If you have a special problem, we'd like to help you lick it. A letter or phone call will summon one of our research engineers. Address The Ironsides Company, Columbus 16, Ohio.



Ironsides



By the makers of Palmoshield • "the palm tree that grows in Ohio"

West Coast Report

Trucks Taking Over Petroleum Business

Gasoline trucks are edging out drums for petroleum business . . . Drum handling costs are main factor . . . But containers make up slack in other fields—By T. M. Rohan.

King-size gasoline trucks are slowly edging out drums for petroleum business in the West.

A purchasing agent of a leading western oil producer said last week that high cost of transporting, handling and reconditioning drums has dropped his firm's purchases about 25-30 pct in the last 5 years.

"Most of the drum manufacturers are starving," he said. "On returnable drums we have to pay about \$6 each now. After delivering it to the consumer we must pick it up, leak-check it, repaint it, take out dents, and recondition it, and we only get about five trips out of it."

However, a leading drum manufacturer told THE IRON AGE that the market for miscellaneous containers including chemicals, frozen produce and meat has more than taken up the slack resulting from decline in use for petroleum. Heavy stress is being placed on development of lacquers and laminated coatings.

Cuts Handling . . . New refinery capacity in the Pacific Northwest is also being geared to bulk delivery. A 4000 gal truck can speedily service wide areas from good paved roads and eliminate all the drum handling.

Even in Alaska where poor roads made use of second-hand drums feasible to eliminate return hauling, road building has progressed and bulk storage and delivery facilities with it.

Use Thinner Gage . . . To trim costs, considerable research has been done by petroleum and drum producers. Latest development is use of thinner 24 gage steel with

swaged reinforcing rings rather than 18 gage to cut costs. Although more fragile, overall initial investment would be cut.

Producers are also attempting to fill drums to full 55 gal capacity rather than conventional 53 gal and are relying on careful handling to eliminate bursting. In this way more oil can be transported per drum.

One major western prop has been military buying representing about 10-15 pct of the market. Heavy production tonnage is going into small 35 gal containers called pails which are easily transported from base to base as requirements change.

Although filling at refineries is time-consuming, smaller containers are much preferred by the military.

Prices Hold . . . Despite hot competition for sales, prices on drums have remained constant, geared directly to the price of steel. Major producers are Rheem Mfg., Richmond, Calif.; Boyle Mfg. Div. of U. S. Steel Products, and Myers Drum Co., Oakland.

Kaiser Steel recently acquired a one-third interest in Myers Drum Co., a major producer (4000 drums and 10,000 pails daily). B. W. Norton Co., Oakland, Calif., is an additional specialty producer concentrating mostly on 25-35 gal pails.

New Producer . . . One Los Angeles reconditioning firm, H. Levine Cooperage Co., plans to enter the drum manufacturing field through a new \$1 million subsidiary, Atlas Steel Container Co. President is H. Denbig Ellis, retired president of Inland Steel Container Co., Chicago.

Atlas will have a rated production of 2000 barrels daily of open and closed top drums, lined and unlined in 15 to 55 gal capacity. First production is expected in 60 days and major output will go to the chemical, petroleum and food industries.

Yolo Project Ending . . . The long talked of program for a \$136 million integrated Yolo Steel & Metal Co. at Sacramento, Calif., has apparently been dropped and the plan now is to go into mining.

In Redding, Calif., G. I. Dumond, head of the project, told a reporter "it is a busted dream."

His visit to the Redding area, now known principally for gold mining, was to option about 4000 acres of ranch land near Shasta Lake on which core drilling would be started for a new project.

Walkout Over . . . Kaiser Steel's longest walkout came to an end at midweek, thanks largely to pressure on the local CIO Steelworkers Union from national headquarters. Dispute over the four powerhouse employees assigned to do a job they considered rigging was returned to normal grievance procedure.

Production loss to Kaiser was probably about 30,000 ingot tons of steel and 20,000 tons of finished products. Worst loss is of plate output.





...but

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More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—with the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!



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Machine Tool High Spots

First Quarter Shows Order Gain

Foreign business helps March index . . . Tool shipments remain at fourth quarter level . . . Not enough new orders to balance production . . . Backlog dwindles—By E. J. Egan, Jr.

Domestic and foreign orders for new U. S. machine tools perked up in March, recovering from a February dip to resume the uptrend begun last December. National Machine Tool Builders' Assn. estimates its overall new order index for March at 169.9, up 10.1 points from February's 159.8.

Foreign sources apparently contributed in fair measure to this latest gain. March index of new foreign orders is estimated at 25.0, highest point since January, 1953, and a 10.6 point increase over the February, 1954, mark of 14.4.

Foreign Orders Help . . . Machine tool shipments to domestic and overseas customers continued at a high rate in March. NMTBA's preliminary index spots it at 326.3, a 3.2 point gain over the final February figure of 323.1.

With the March figures reported in, quarterly comparisons show the industry with a slight new order gain over fourth quarter last year. Estimated average of new orders for the first quarter of this year is 167.7 compared with the October-December, '53, average of 165.0. But in the first quarter of last year, the index averaged 288.3.

Index averages of machine tool shipments on a quarterly basis compare as follows: First quarter 1954, estimated at 322.9, almost the same as the 323.3 average for 1953's final quarter. In first quarter '53, shipments averaged 364.0. Averages are figured on a 1945-1947 base scale of 100.

Not Enough Orders . . . Although new order gains are welcome news to American machine tool builders, they are not coming in fast enough to balance the high rate of production and shipments.

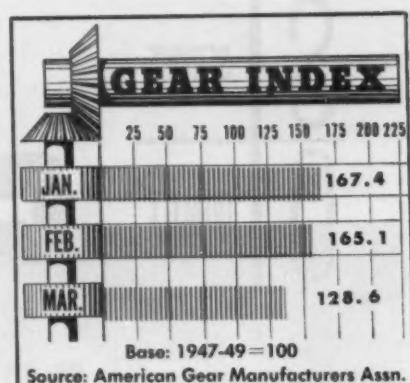
Net result is a continuing drop in the backlog.

Latest NMTBA estimate of unfilled orders to the industry's demonstrated production rate is 4.6:1. This means backlog amounts to about 4½ months. Backlogs have been slipping steadily since January, 1952, when production schedules bulged with 18 months of orders on hand.

Show Gain . . . A slight rise in new orders during March is also reported by the American Supply & Machinery Manufacturers' Assn. High point of a consecutive 3-month gain, the March index for this group stands at 141.5, one point above the February figure of 140.5.

Recent low for this index was 136.7, established in December, 1953. But the gain since January of this year is running counter to the Federal Reserve Industrial Production Index and association headquarters predict an early up-trend in overall U. S. production.

In contrast, however, business volume in the gearing industry is down for the third consecutive month. American Gear Manufacturers' Assn. March index is at



128.6, a 22.1 pct drop from the 165.1 figure reported in February. In January of this year, the index stood at 167.4.

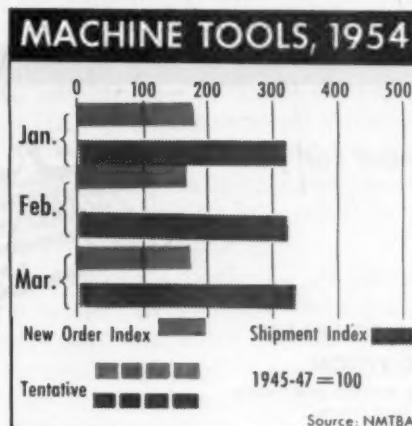
Renegotiation Hassle . . . U. S. Chamber of Commerce recently urged the Senate Finance Committee to amend the House-approved bill to extend the Renegotiation Act. The Chamber's proposal seeks to eliminate "discrimination" against manufacturers of new durable equipment by making the partial exemption clause retroactive to Jan. 1, 1951.

The House measure would extend to prime contractors the partial mandatory exemption from renegotiation now authorized for subcontracts for such equipment. But the exemption would only be retroactive to June 30, 1953.

Chamber of Commerce claims this exemption doesn't go back far enough, maintains most prime contracts were made between January, 1951 and December, 1953.

Presses in Automation . . . Presses of the future will lend themselves even more to completely automated production set-ups, according to T. W. Bannon, chief engineer, Clearing Machine Corp., Chicago.

Feeding and unloading components will become standard equipment. Electronic controls will actuate the press, or perhaps the entire press line will be operated from one master control panel.



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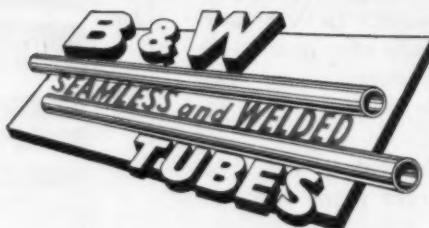
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The Iron Age

SALUTES

James L. Wagoner

With nationwide recognition in both hobby and profession, he "retired" to spark a new firm's sales force.



FEW men are widely known in two entirely different fields but Doc Wagoner qualifies. His activities as an amateur astronomer have brought him to the attention of fellow star-gazers from coast-to-coast, and his name is a familiar one to the nation's top industrial electricians.

After a highly successful career in electrical engineering, Doc, vice-president and national sales manager of Multi-Amp Corp., of Harrison, N. J., did not turn toward retirement and the traditional cottage in Florida or the favorite trout stream. Instead he jumped right back into the thick of his field to head up the sales and promotion of a new electrical testing instrument.

Doc's 32 years with Westinghouse Electric Corp. as head of the Agency & Construction Section and Manager of Thermal Breaker Products gained him a national reputation for translating technical material into everyday language. He's been a regular contributor of magazine articles on industrial electrification.

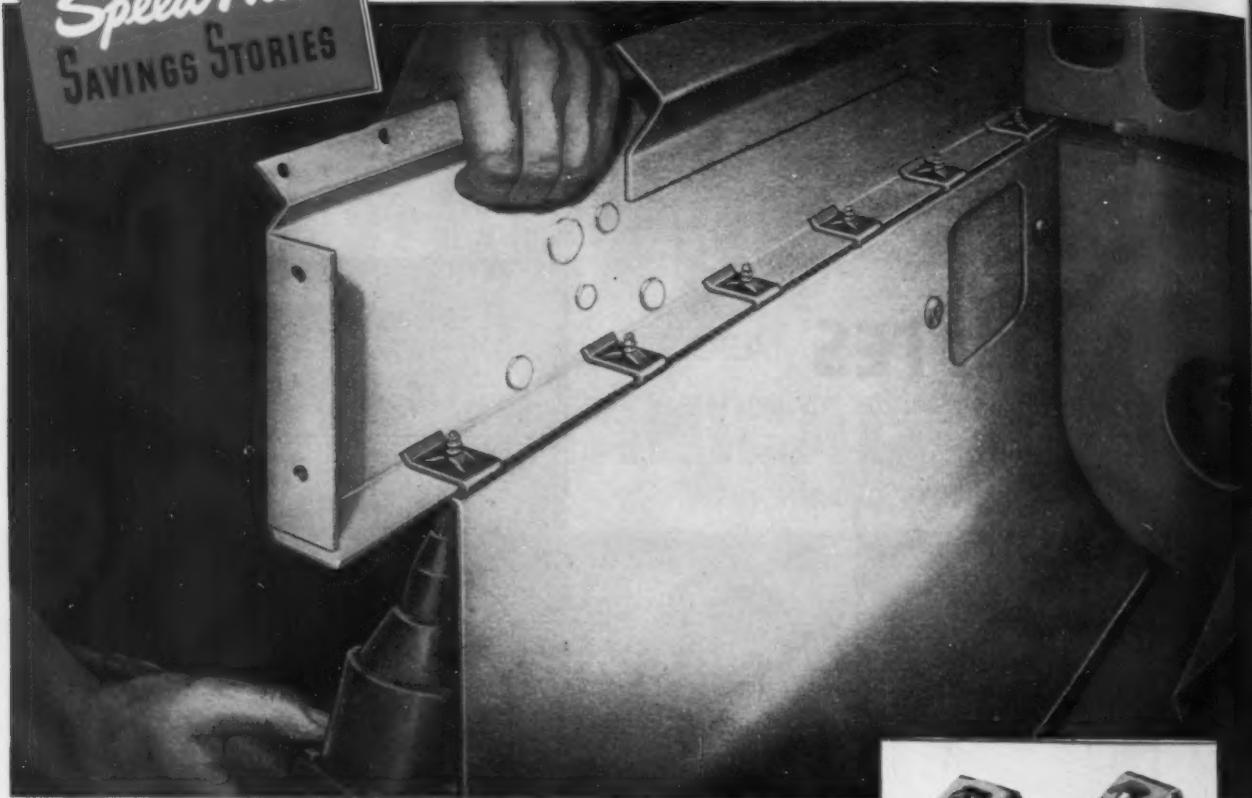
Launching a new product like Multi-Amp's tester is a natural for Doc. While at Westinghouse he gave lectures all over the U. S. telling sales groups what new products could do for their customers.

A long time member of the Astronomers Assn. of Pittsburgh, Doc built his own 6-in. reflecting telescope. He spent 14 weeks grinding and polishing the instrument's mirror to 4-millionths of an inch accuracy.

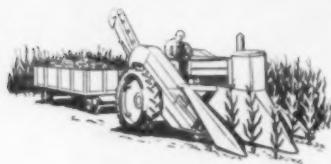
Doc has enlightened fellow star-gazers with articles and slide talks, and if his busy schedule with Multi-Amp will permit, he'll be able to finish the book he's writing on the subject.



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Everybody reaps the benefits of John Deere's fastener engineering on their new No. 227 Corn Picker. The farmer saves maintenance hours . . . the dealer makes fewer service calls . . . and



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Write for your copy of "SAVINGS STORIES"—a volume filled with fastening ideas. TINNERMAN PRODUCTS, INC., Dept. 12, Box 6698, Cleveland 1, Ohio. In Canada: Dominion Fasteners Ltd., Hamilton, Ontario. In Great Britain: Simmonds Aerocessories, Ltd., Tre-forest, Wales. In France: Aeroaccessoires Simmonds, S.A., 7 rue Henri Barbusse, Levallois (Seine).



Personnel

The Iron Age

INTRODUCES

William P. Drake, named president, new Industrial Chemicals Div., PENNSYLVANIA SALT MANUFACTURING CO., Philadelphia.

Frederick J. Darby, elected president and works manager, AMERICAN EMERY WHEEL WORKS, Providence; Harold O. Skoog, appointed vice-president and ceramic engineer; and William W. Turner, promoted to secretary and sales manager.

Thomas E. Millsop, elected president, NATIONAL STEEL CORP., Pittsburgh.

E. S. Russey, elected a member of the board of directors, BORG-WARNER CORP., Chicago.

Joseph Halperin, appointed vice-president, AEROIL PRODUCTS CO., INC., New Jersey.

Dr. John T. Rettaliata, elected director, AMERICAN STEEL FOUNDRIES, Chicago.

J. D. Kelsey, named administrative assistant to the president, STANDARD RAILWAY EQUIPMENT MANUFACTURING CO., Chicago.

David S. Meiklejohn, elected director, AMERICAN MACHINE & FOUNDRY CO., New York.

Paul W. Hook, treasurer, elected to board of directors, WELLMAN BRONZE & ALUMINUM CO., Cleveland.

Herbert B. Nichols, appointed manager of public information, GENERAL ELECTRIC CO., Schenectady.

Robert Wilson, elected to the board of directors, THE LINCOLN ELECTRIC CO., Cleveland.

Clinton E. Frank, elected to board of directors, STANDARD RAILWAY EQUIPMENT MFG. CO., Chicago.

E. A. Brophy, elected vice-president, BRAEBURN ALLOY STEEL CORP., Braeburn, Pa.

Merrill Cox, elected to board of directors, ARTHUR G. MCKEE CO., Cleveland; and Myran J. Livingston, elected to board of directors.

W. C. Newberg and E. C. Quinn, elected to the board of directors, CHRYSLER CORP., Detroit.

Joseph A. Neubauer, and David G. Hill, elected members of the board of directors, COLUMBIA-SOUTHERN CHEMICAL CORP., Pittsburgh.

Joseph L. Block, elected member of the board of trustees, ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago; and Charles C. Jarchow, named member of the board of trustees, also.

William A. Illsley, promoted to district sales engineer, Detroit office, AMERICAN WHEELABRATOR & EQUIPMENT CORP., Indiana; W. J. Sutherland, appointed district sales engineer, Massachusetts office; and C. J. Osborn, promoted to district sales engineer, Cleveland office.

Richard A. Simonsen, appointed chief engineer, Melrose Park Plant, MISSISSIPPI VALLEY STRUCTURAL STEEL CO., Chicago.

Harold L. Heuser, placed in charge of sales of standardized conveyors, Cleveland area, MATHEWS CONVEYER CO.



RALPH HOWE, elected president, New Britain Machine Co., New Britain, Conn.



ARTHUR W. MCKINNEY, elected president, The National Supply Co., Pittsburgh.



GEORGE S. MIKHALAPOV, elected president, Coast Metals, Inc., Little Ferry, N. J.

Personnel

P. R. Grossman, appointed chief research engineer, Research and Development Center, THE BABCOCK & WILCOX CO., New York; A. F. Boehm, becomes manager of facilities; and W. O. Stone, Jr., appointed purchasing agent.

Clifford Canning, appointed sales engineer, Ohio, Indiana and Kentucky, PIVOT PUNCH & DIE CORP.

William W. Deal, named manager, Chicago district sales office, U. S. STEEL CORP.; Fred L. Nonnenmacher, appointed district manager of sales, New York; and William F. Baker, appointed assistant credit manager, Chicago.

Edward H. Wheeler, made manager, Forging Div., STANDARD PRESSED STEEL CO., Jenkintown, Pa.; and John M. Sherman, named chief engineer.

James G. Wray, appointed manager, CONTINENTAL CAN CO., Syracuse Machine Plant.

Oliver Fuller, named manager, P & H Electrical Sales Div., HARNISCHFEGER CORP., Chicago.

James P. Parker, named manager, liquefied petroleum gas tank sales, SCAIFE CO., Oakmont, Pa.; and G. Howard Yandell, appointed salesman.

Eric Newman, becomes manager, Export and International Div., ROCKWELL MANUFACTURING CO., Pittsburgh.

Rodney F. Coltart, appointed sales manager, Central Pacific Div., San Francisco plant, LINK-BELT CO.; and Benjamin M. Prestholt, named sales manager, Southern Pacific Div., Los Angeles plant.

Joseph B. Talley, named manager, Missouri Ammonia Works, Louisiana, Mo., HERCULES POWDER CO.



JUDSON S. SAYRE, elected president and general manager, Norge Div., Borg-Warner Corp., Chicago.



DON WATKINS, appointed vice-president, Continental Foundry & Machine Co., Pittsburgh.

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WESTON G. THOMAS, elected executive vice-president, Climax Molybdenum Co., New York.



G. E. BURKS, appointed director of engineering and research, Caterpillar Tractor Co., Peoria, Ill.

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Hydroform



Here is the newest member of the Cincinnati Hydroform family . . . a 19" machine which provides manufacturers with facilities for producing parts from blanks up to 19" in diameter, having a maximum drawn depth of 8". Material thickness of the formed part can range up to $\frac{3}{8}$ " cold rolled steel. A maximum forming cavity pressure of 15,000 psi provides the same high degree of formability that is available in the 12" and 26" Hydroform machines. Many intricate shapes can be formed in one operation, as the percentage of reduction in the draw is far greater than is obtainable by conventional practice.

The hydraulic power unit for the 19" Hydroform is pit mounted to provide unobstructed floor space

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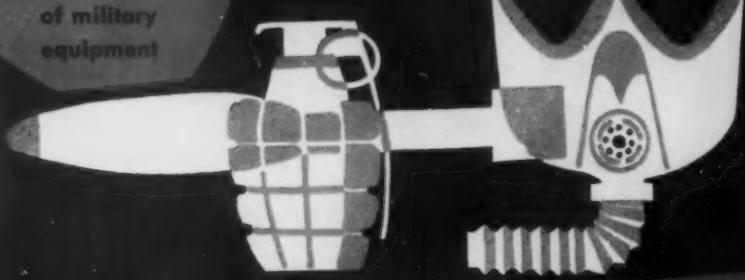
Is your company fully informed of the many Hydroforming advantages? Let a Cincinnati Milling field engineer give you complete details. For general Hydroform data and specifications of the 8", 12", 19", 23", 26" and 32" Hydroform machines, write for your copy of Bulletin M-1759-3.



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ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

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Personnel

Continued

Edward M. Strauss, Jr., named assistant manager, Commercial Research Div., ALUMINUM CO. OF AMERICA, Pittsburgh.

A. E. Carter, named assistant general manufacturing manager, Tractor & Implement Div., FORD MOTOR CO., Birmingham, Mich.; Lyle W. Blanchard, named manager, Manufacturing Engineering Dept.; W. R. Phillips, named manager, Quality Control Dept., Tractor & Implement Div.; and F. W. Scooneas, becomes manager, Plant Engineering Dept.

Robert M. Simpson, named assistant manager, CRUCIBLE STEEL CO. OF AMERICA, Pittsburgh.

Patrick J. Patton, appointed East Central regional supervisor, Positioning Equipt. Div., WORTHINGTON CORP., Harrison, N. J.

Robert M. McKinley, appointed technical representative, Glass Div., Product Development Dept., PITTSBURGH PLATE GLASS CO., Pittsburgh.

OBITUARIES

Harry L. Bill, 72, vice-president and general manager, Greenfield Tap & Die Corp., Greenfield, Mass., recently while on a trip.

George W. Bach, chairman of the board of American Sterilizer Co., recently.

G. T. Van Alstyne, 62, director of advertising and publicity, Air Reduction Co., Inc., recently, at his home in Plainfield, N. J.

Werner H. C. Berg, director of research, Whitney Chain Co., and Hanson-Whitney Div., Hartford, Conn., recently.

Philip O. Geier, former treasurer and chairman of the board of The Cincinnati Milling Machine Co., until his retirement three years ago, recently.

William S. Newell, 76, chairman, Bath Iron Works Corp., recently.

E. B. Smith, advertising manager, Veeder-Root, Inc., Hartford, Conn., recently.

More parts per hour—



Drop Hammer, Trapped Rubber Dies Form Aircraft Parts Faster



By T. M. Rohan
West Coast Editor

- ◆ Trapped rubber dies used in a drop hammer and with conventional form blocks have helped one aircraft company boost part production rate and improve part quality . . . Output was raised from 300 to 1250 pieces per 16-hr day . . . Engineers visualize future production as high as 1800 formed parts per day.
- ◆ Both aluminum and annealed stainless steel parts have been formed successfully . . . High impact pressures, up to 10,000 to 22,000 psi, eliminate many wrinkles common with lower pressures and slower speeds . . . Some parts with critically formed areas require a first strike, some hand forming, and a restrike.

◆ FORMING of small aluminum and annealed stainless steel aircraft parts on a drop hammer using trapped rubber dies has boosted parts production rate and improved part quality at Consolidated Vultee Aircraft Co., San Diego, Calif.

To speed production of many small parts made by conventional hydraulic press forming methods, tool engineers decided to try drop hammer forming using trapped hard rubber. Output was increased from 300 to 1250 pieces in a 16-hr day using a Chambersburg Ceco-Stamp No. 40 drop hammer. Savings are estimated at \$1200 per week. Tool engineers now feel production could hit 1800 pieces per day barring interruption for die changes.

Due to higher forming pressures, which reach from 10,000 to 22,000 psi, formed parts are of better quality. Extreme impact pressures compress the metal so that wrinkles around curves are either eliminated or materially reduced.

About 926 different production lots of parts of various sizes, shapes and material thicknesses have been run. Stock thickness ranged from 0.020 in. (stainless steel) to 0.051 in. (clad 24 SO). Parts were formed on existing form blocks with minor alterations. Part size is limited to 18 in. in diam on No. 40 hammer and 36 x 24 in. on the No. 96 hammer. The hammers operate off regular 100-lb plant compressed air line. For the new hammer impact dies measuring 24 x 36 in. are being designed.

The rubber die for the No. 40 hammer is 18 in. in diam x 4½ in. deep and close fitted into a welded steel casing. Die and anvil are welded with ¼-in. LH 70 Lincoln welding rod at 650°F and reheated for stress relief after weld.

In operation, compression from extreme hardness of the rubber and pressures up to 22,000 psi eliminate many wrinkles common with lower pressures and slower speeds. Pressings of up to 20° off the vertical can also be made in certain

Skill of drop hammer operator plays an important part in the success of the operation . . .

instances. Softer rubber will fill in satisfactorily but does not have sufficient hardness to shrink the metal.

Skill of the drop hammer operator plays an important part in success of the operation. After the operator gets the "feel" of working with maximum striking pressures of 10,000 to 22,000 psi, better performance is attained. In production runs, a loose blanket of $\frac{1}{2}$ -in. thick rubber of 90 Shore hardness is often used to avoid compression wrinkles in flanges and joggle areas. To give the operator the "feel" he should first strike the part without the blanket, then with it to get the maximum force and also determine when the blanket is necessary. Formed parts should be removed from the die with extreme care to avoid distortion.

Dies occasionally must be elevated off the base to get optimum forming and sideways pressure. On some parts with critically formed area, complete forming cannot be accomplished with one strike. In these cases, after the initial strike, the loading assistant does some hand-forming and a second strike is made.

For aluminum parts, forming works out best with metal in the SW condition (solution heat treated, unstable temper). Complexity of the form required is the governing factor.

Stainless steel forming in annealed condition has been exceptionally successful. Radii, contours and flanges form very close to the block. Titanium has also been successfully hot formed using this method.

A polish operation is required on edges of the part where a compression or stretching of material occurs. In corner relief areas, stringer



TRAPPED RUBBER DIE is a rubber pad, 70 to 80 Durometer, held in hot rolled welded steel die.

BEND RADII AND SPRINGBACK

Material	Springback*	Min. Radius
24SO.....	3°	2T
24SW.....	5°	2T
75SO**.....	3°	2T
Stainless Steel**.....	3°	2T

* For 2T minimum radius. Variations in bend radii will affect springback.

** No parts formed in 75ST aluminum or $\frac{1}{2}$ hard stainless steel.

cutouts, etc., where cracks develop in the bend radius, edges must be sanded smooth.

Parts requiring heat treat prior to forming must be roll straightened following heat treat if size permits.

Form Block Fabrication

(1) All surfaces of form block covered by the completed part must be smooth and free of nicks and scratches.

(2) Form blocks should be at least 1 in. thick. Parts with flanges exceeding 0.75 in. in height must have from 0.25 to 0.37 in. clearance between the edge of flange and bottom face of form block.

(3) Mild steel is best suited for form blocks. Both Dural and Kirksite, however, are satisfactory for production runs under 75 pieces. Dural or Kirksite blocks with steel inserts such as "Q" bead forming and cutting rings deteriorate rapidly due to high forming pressure.

(4) Standard straight pressed-in locating pins are not recommended. They become imbedded in and lead to deterioration of the rubber pad. Removable button head locating pins



TYPICAL DIE SETUP in drop hammer with form block and formed part set up on the anvil.

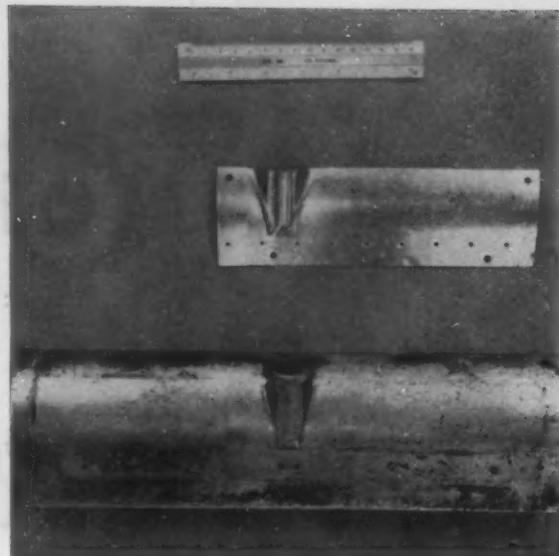
(thumb tack type) have proven satisfactory. This type pin eliminates pulling of holes during the forming operation. Extreme care should be taken in placing of locating holes when using button head pins. A clearance of $\frac{1}{2}$ in. from formed surface to edge of button should be provided. Pin holes should be at least $\frac{3}{4}$ in. deep.

(5) Form blocks should not have riser blocks or base plates extending beyond perimeter of the form block except where the form block must have support to eliminate tipping or rolling under the rubber impact.

(6) Forming of open and closed angles up to approximately 30° has been successful without the use of traps on the tool.



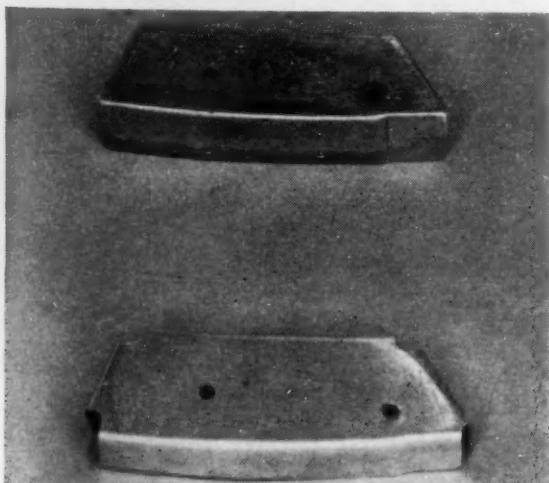
TIME PER PIECE has averaged 45 seconds on many parts. Parts from 0.032 in. clad 24 SO, are formed in solution heat treated condition.



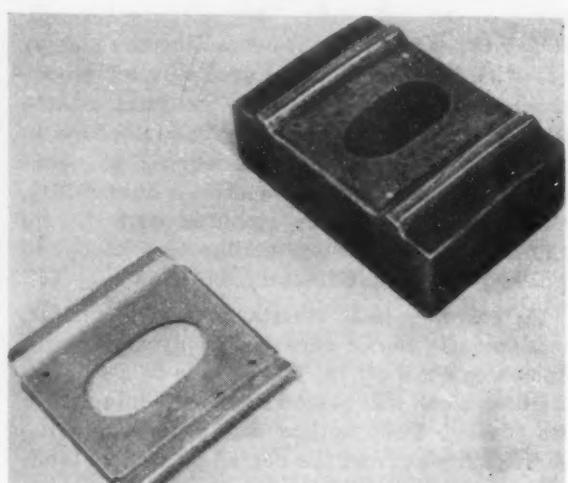
TWO-INCH DURAL BLOCK with steel insert in area of lips was needed to produce this part from 0.040 in. clad 24 SO. Forming time per piece averaged 20 seconds. Two strikes were required. Higher forming pressures attained with the trapped rubber dies and drop hammer, 10,000 to 22,000 psi on impact, compressed metal so wrinkles around curves are reduced.



THREE TYPICAL formed parts shown with both the flat sheet blank and the form block used.



TWO STRIKES with intermediate heat treat were needed for perfect set in radii and joggles.



ANNEALED STAINLESS STEEL part, of 0.020 in. stock, formed on Kirksite block $2\frac{1}{2}$ in. thick.

No design time—

Plastic Welding Fixtures Cost Little, Assure Accuracy

◆ WELDING FIXTURES consisting of detailed machined pieces mounted on metal bases are often complex fabricating jobs. So complex in fact that the costs of such fixtures from the design stage to the finished product are quite top heavy. Faced with this problem, Chance Vought Aircraft, Inc. studied the possibility of using plastics for this purpose. As a result, design time has frequently been completely eliminated and fabricating time averages about one-fifth that for metal tooling.

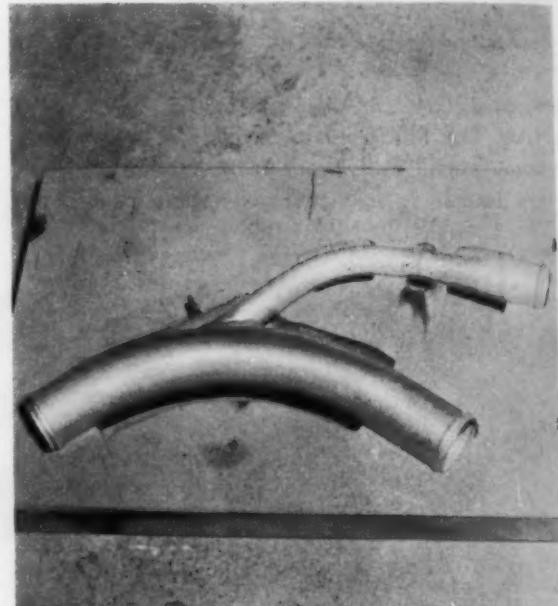
The chief objectives of a three-pronged research program were to determine the effect of welding heat on plastic surfaces, to evaluate the properties of welds made in plastic fixtures, and to compare costs and efficiencies of plastic and steel fixtures. In determining the effect of heat on the plastic, both the inert gas-shielded arc welding and gas welding processes were used.

Three molds evaluated

The plastic fixtures were made so that joints could be welded under three different conditions: (1) with the joint contacting the plastic, (2) with the joint located over a relief groove in the plastic, and (3) with the joint located over a grooved metal chilling bar imbedded in the plastic. Phenolic resins curing at about 200°F were chosen because of their availability, ease of heating and reasonable cost. Liquid phenolic tooling resins similar to PR506 and R72S should be satisfactory.

To evaluate heat resistance of the plastic, three plastic blocks were cast in plywood forms. Each was 6 x 9 x 1 in. The tube to be welded in the first block was placed in direct contact with the plastic. This method was soon eliminated because fumes from the heated plastic contaminated the lower weld bead.

The second block was cast with a $\frac{3}{8}$ in. wide by $\frac{1}{4}$ in. deep longitudinal groove to provide



CLEARANCE around tube joints allows for welding and variation in contour. Direct contact would char mold and contaminate weld.

clearance beneath the weld. About 30 satisfactory welds were made by this method with only minor charring occurring at the edges of the groove.

The third block incorporated a $\frac{1}{4}$ -in. thick by $1\frac{1}{4}$ -in. wide copper chill bar with a $3/16$ -in. wide by $1/16$ -in. deep groove. Size of the lower bead can be controlled by machining the groove to the desired dimensions. The chill bar may be of cast or wrought copper, or of other material having good conductivity. About 30 welded joints were made on this block. All beads were satisfactory and the block showed no signs of deterioration.

With this experience, a sample part of nominal size was chosen for casting a block. This sample was built up with tape or modeling clay



By A. P. Challenger

Tool Research Engineer
Chance Vought Aircraft, Inc.
Dallas

- ◆ Welding fixtures made of cast phenolic resin offer a substantial cost advantage over metal fixtures . . . Design time is often eliminated entirely, and average fabricating time is reduced to about one fifth . . . Resin is cast around a sample part set in a wooden box, then cured in the usual manner.
- ◆ Assemblies with more than one plane require additional pouring for each new level . . . Plastic fixtures retain dimensional stability . . . Force fits shatter the fixture rather than permit distortion . . . After 30 satisfactory welds, fixtures show no signs of deterioration.



PLASTIC FIXTURES with more than one plane require extra pouring for each new level. Good nesting gives a visual check on the accuracy.

at points where it was advisable to relieve the fixture from the assembly to be welded. This method provided the necessary clearance at the tube joint for welding and also allowed for some variation in the contour of the bend.

A shallow box of wood was made to allow enough space around the part so that the casting would have sufficient strength. The built-up assembly was then set in the box and supported on the box floor by wood or plaster V blocks. This gave about a $\frac{1}{2}$ -in. casting thickness underneath the assembly. The casting resin was then poured until it reached half the height of the assembly. After pouring, the casting was cured in the usual manner.

When an assembly extends through more than one plane, additional pours establish each new



NO DESIGN TIME and less fabricating time favor use of plastic fixtures. Heated plastic is poured to half the assembly depth, then cured.

level. Supporting metal structures and inserts are cast in place. After curing, the fixture is ready for use without further processing.

From a precision standpoint, a plastic fixture has exact dimensional stability as long as it remains unbroken. Force fits will shatter the fixture rather than yield to distortion. Steel or other metal tooling can be damaged in handling and if the operator is unaware of the damage, it may result in the production of faulty parts.

Positive nesting of an assembly in the fixture prior to welding gives a quick check on its accuracy. The fixture itself assures dimensional accuracy through its rigid cast construction. Direct heat from the welding torch will char the plastic, but no fire hazard exists because the material will not support combustion.

Added protection—

Hydraulic Buffers

Stop Loaded Trolleys Safely



By W. H. Lehr, Engineer
Crane & Bridge Dept.
Dravo Corp.
Pittsburgh

♦ POSITIVE, SAFE STOPPING of loaded man trolleys on ore bridges, unloaders and coal towers can suddenly become a serious problem. If limit switches should fail to decelerate the trolley; if brakes won't hold on icy or wet rails; if buffer stops are not adequate, the result could be costly injury to personnel and damage to equipment. Cost of installing adequate buffers at the ends of trolley runways can be a minor item compared to possible damage repair and accident compensation.

Dravo Corp., Pittsburgh, has developed two sizes of hydraulic buffers for positive stopping of trolleys on materials handling structures. First installation was made on a 15-ton ore bridge. The man trolley of this bridge weighs 151,000 lb, exclusive of bucket and load, and its maximum speed is 900 fpm.

Two buffer units are mounted on the bridge span, one at each end of the trolley runway. Each unit is designed for a maximum stroke of 6 ft but will stop the trolley in slightly less than this distance even at full impact speed.

Each buffer unit consists of two hydraulic cylinders mounted parallel to the trolley runway. Their pistons are connected across the runway by a bumper beam which takes the impact of the trolley frame.

Automatic latches reset buffer

An automatic latching device resets the buffer on completion of its work stroke. On impact, the latching device fastens the buffer beam to the trolley frame where it remains fastened throughout the work stroke. When trolley travel is reversed, the beam and pistons follow the trolley until they are in their original position, where latches are released.

- ♦ A loaded trolley on a materials handling structure has a lot of inertia when it gets rolling . . . To stop one safely takes decelerating limit switches, brakes, buffers at the ends of runways.
- ♦ Two types of hydraulic buffers recently developed offer positive stopping action under high impact . . . Cost of installation can be a trifle compared to possible damage, downtime, injury to personnel if a trolley breaks loose . . . One buffer decelerates gradually; the other provides a short, emergency stop.

The buffer unit was thoroughly tested before installation. The test set-up used a single buffer cylinder securely mounted on a railroad car. Another car was loaded to weigh approximately half as much as the actual trolley, and was coasted into the buffer at high and low speeds. All stops were smooth.

Final tests were run on the actual installations. The last of these ran the trolley into the buffers at full speed. Dravo engineers were aboard at the time. All tests proved successful, and the installation has continued to give satisfactory service.

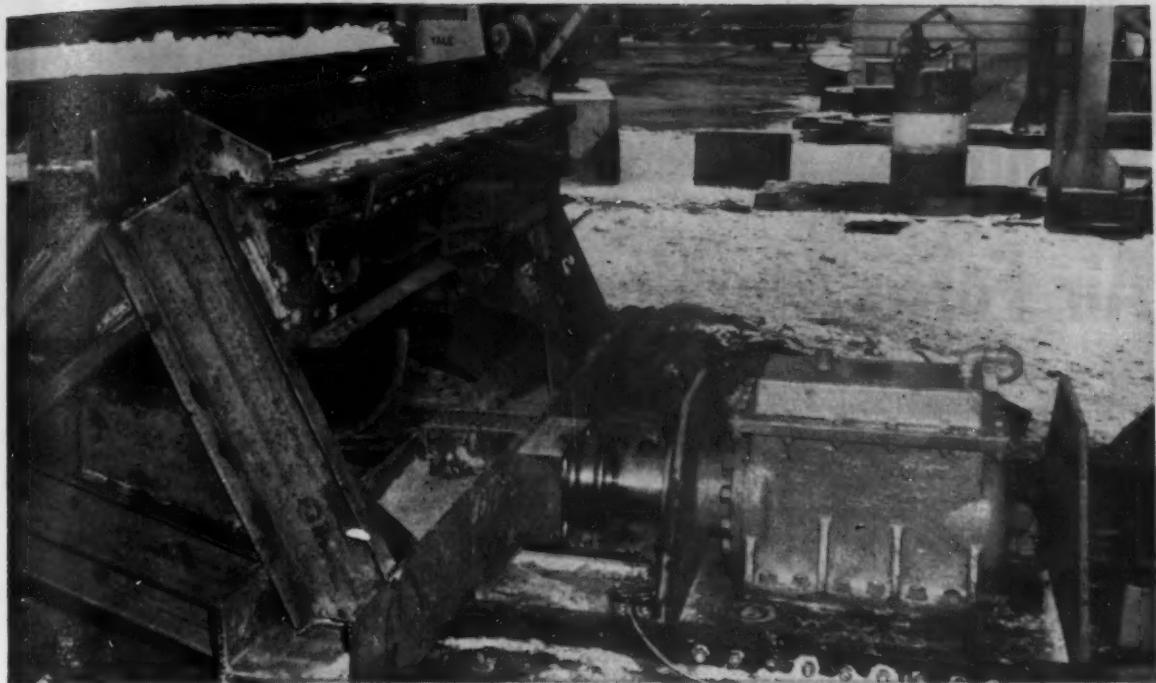
The hydraulic buffer needs little maintenance. Moving parts of the latching mechanism are mounted in self-lubricating bushings and the only attention the cylinder requires is a periodic check on the hydraulic fluid level.

Lighter unit fits small space

In another installation, space and weight considerations required a smaller, lighter buffer unit. To solve this problem, a buffer with two hydraulic push-type cylinders was designed. Pistons are arranged for direct contact with the trolley frame and require no bumper beam. A piston stroke of only 2 ft makes the entire unit lighter and more compact. The piston has a spring return.

Hydraulic arrangement of the 2-ft stroke buffer is similar to the longer stroke units. Passage of the piston gradually restricts flow of the hydraulic fluid. The forces involved are increased with the shorter stroke distance.

The short stroke buffer was tested by mounting it on a plate bolted and welded to a standard-gage railroad track. A flatcar was loaded to



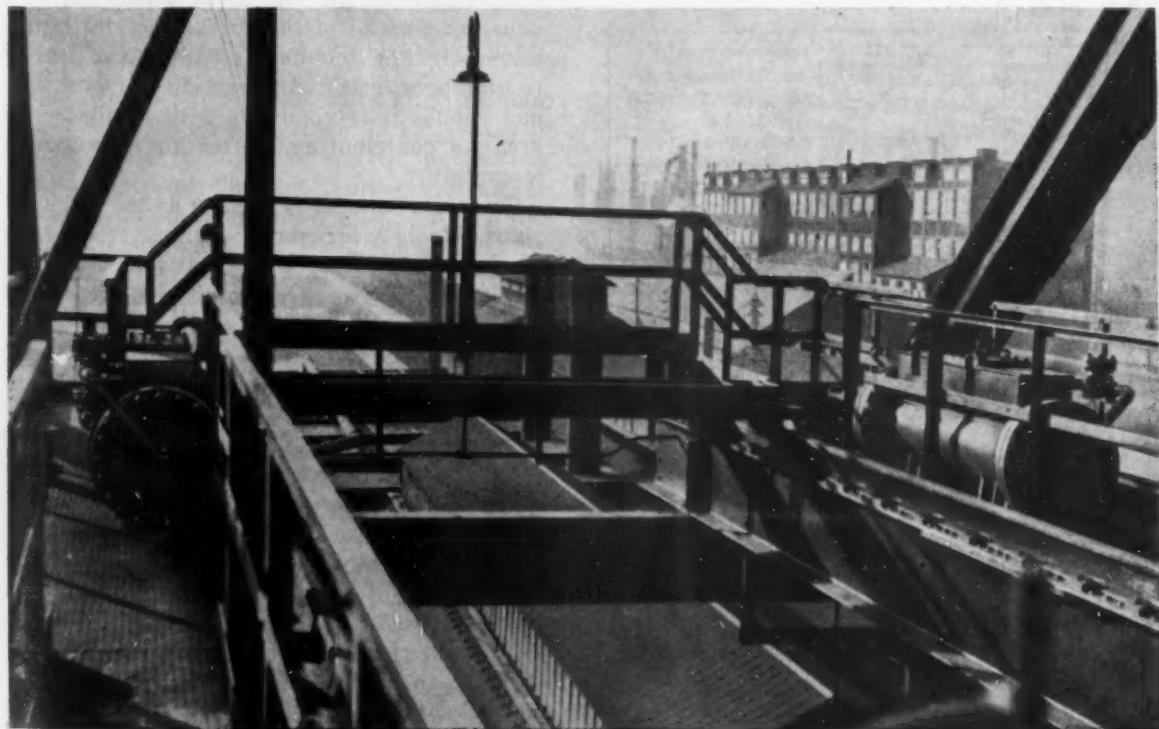
LOADED FLATCAR tests emergency stop action of a 2-ft stroke hydraulic type buffer unit.

half the weight of the trolley which will actually be used. The car was fitted with a built-up bumper to contact the buffer assembly. Test runs were made at various speeds, including a speed above that of normal trolley operation. In all cases the buffer stopped the car smoothly and effectively. Piston stroke was approximately 2 ft at all impact speeds.

The test demonstrated that hydraulic buffers with a 2-ft stroke can be expected to operate

as successfully as the 6-ft stroke units. Other short stroke units have recently been installed on three additional ore unloaders.

Action of the short and long stroke units is different, as is the weight and speed range in which each may be used. The 6-ft stroke buffer provides a gradual stop while the shorter unit stops a trolley much more abruptly and may be considered a full speed emergency or "crash" device.



TWO 6-FT HYDRAULIC buffers, bumper-connected at one end of an ore bridge for safe stopping.

Titanium:

Air Force Machinability Report

- ◆ Basic titanium machinability data needed for long range planning has been provided in the United States Air Force Machinability Report for 1954 . . . Here are feeds, speeds, tool life, power requirements and other important data to use as a guide in programming more titanium through your plant.
- ◆ Big problem in machining titanium is short tool life stemming from high temperatures generated during machining . . . Tool sharpness is especially important and tools should be changed promptly to avoid breakdown . . . Climb milling helped minimize chip adherence in milling operations.

Part I

◆ TITANIUM MACHINABILITY data covering factors of prime importance to tool and production engineers have been made available in a comprehensive report prepared under the direction of Curtiss-Wright Corp., Wood Ridge, N. J. The *United States Air Force Machinability Re-*

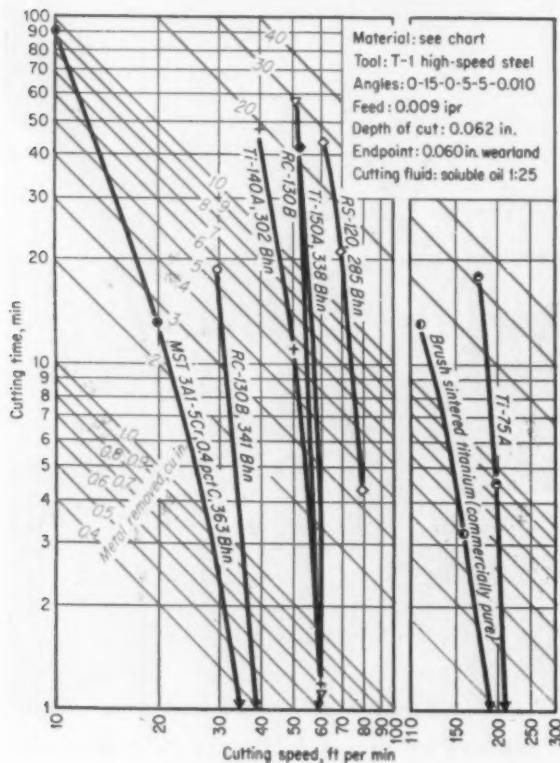
port, 1954, provides management with well defined guides to aid in planning for increased production and lower costs in machining titanium parts. Test work for the project was done by Metcut Research Associates of Cincinnati.

Major reasons for difficulty in machining titanium are: (1) A surface action with common tool materials resulting in unusual abrasiveness and a tendency to gall and smear. (2) High temperature at the tool point which may be a cause and result of the surface action. (3) An unusually low tool-chip contact area leading to high pressures at the tool tip. (4) Low thermal conductivity combines with small contact area as contributing causes to high tool-tip temperature.

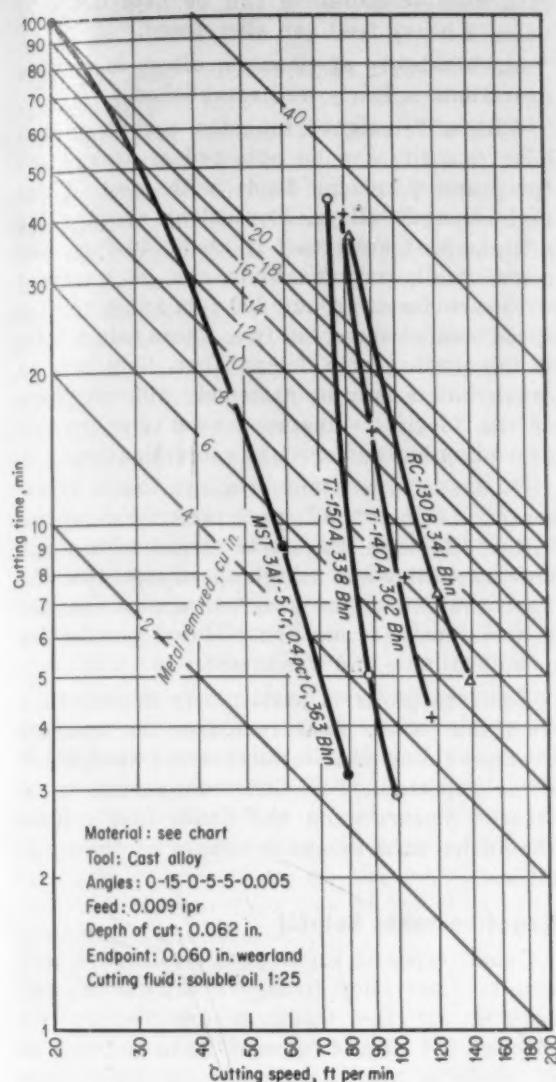
Titanium cuts easily as long as the tool stays sharp. Tools wear slowly at first, then after an appreciable wearland has developed, subsequent wear may progress rapidly to breakdown. In machining titanium it is important to watch tools carefully and to remove them from service before work spoilage can occur. Neither work hardening, which is slight, nor the relatively low machining forces fully explain the phenomenon of low tool life associated with titanium.

Titanium alloys work harden slightly in machining. Test results show an increase of only about 50 points Knoop, 500 g load, while annealed AISI 8640 steel work hardens three times as much. The high-temperature jet-engine alloys show an increase in machined-surface hardness of more than 200 points. Further, the depth of work hardening with titanium is less than 0.005 in. compared to 0.020 in. in the high temperature alloys.

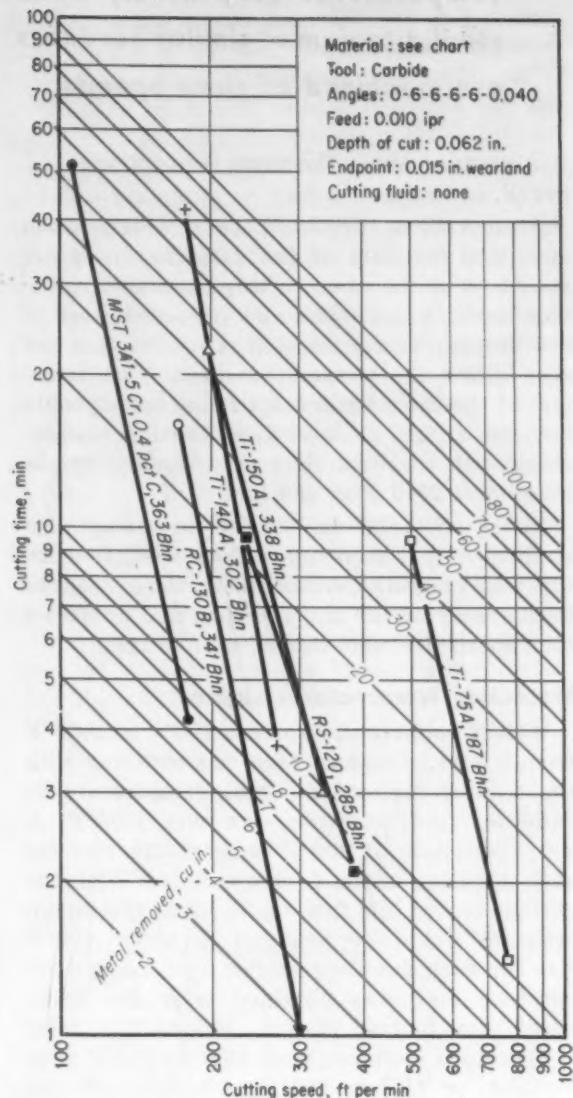
High Speed Steel Tool Life



Cast Alloy Tool Life



Carbide Tool Life



Coefficient of friction in machining titanium is not high and good surface finish is easy to obtain. Shear strength values are lower than those of steel or the high temperature alloys. Commercially-pure titanium machines with less shear strength than any steel. Horsepower required to cut titanium is low. Values for Ti-150A and RC-130B are the same as, or less than those for AISI B1112 steel, both with carbide and high-speed steel tools. Values for Ti-75A are roughly 30 pct less than for Ti-150A.

Short contact between chip and toolface is characteristic of titanium. This results in correspondingly low area of contact at a given depth of cut, thus concentrating the heat at the cutting edge to a greater extent than with other metals. This is linked with high cutting temperature. In addition, the short contact puts most of the cutting force on or near the edge. When toolface cratering occurs, it is very near the edge and total breakdown is likely to occur quickly.

Abrasiveness and galling are prominent among the reasons for poor tool life. Impurities

combine with the parent metal to form extremely hard microconstituents. Carbon content is critical in machining. Alloys containing much over 0.2 pct carbon are virtually unmachinable with high-speed steel tools. Hard microconstituents contribute to rapid tool wear. Galling, that property of titanium whereby it rubs off, on or welds itself to tools, is particularly troublesome in milling, drilling and sawing.

A cutting tool dulls primarily because of abrasive wear. Resistance to wear, an important tool property, is closely related to hardness. Both factors, and tool life, decrease as temperature is increased. Hardness of high speed steel tools falls off rapidly after about 1000°F, and 1100°F is sometimes considered the limit of practical operation. Carbide tools are usually serviceable up to 1300°F or 1400°F.

To stay within these limits, cutting speeds must be restricted. With high-speed steel tools, Ti-150A of 300 Bhn or AISI 4340 quenched and tempered to 300 Bhn, cutting speeds of 40

Temperatures vary widely when steel, titanium of similar hardness are machined at same speeds.

fpm produce about the same temperature: 800°F.

Temperatures produced vary widely when steel and titanium of the same hardness are machined at the same cutting speeds with carbide tools. A quenched and tempered steel of 300 Bhn can be machined at about 300 fpm and stay within the temperature limit. With titanium of the same hardness, cutting speed would have to be less than 70 fpm. Cutting temperature with titanium rises very rapidly, reaching almost 2000°F at 250 fpm.

Effect of feed on temperature was also studied. A 10:1 feed range, from 0.002 to 0.020 ipr was chosen. Carbide tools were used at fixed speeds of 100 and 200 fpm, and an 18-4-1 high speed steel tool was used at 40 fpm.

Machining temperatures studied

Widest temperature spread, 1000° to 1660°F from lowest to highest feed was obtained with the carbide tool at 100 fpm. Temperature at 0.010" in. feed, however, was over 1500°F. A rough estimate of 200°F temperature rise for each doubling of the feed was noted. With the carbide tool at 200 fpm, on Ti-150A, this rough estimate would be modified to about 100°F rise for each doubling of the feed. Least temperature rise was obtained with the high-speed steel tool at 40 fpm. Around 200° total temperature increase, from 650° to 850°F with Ti-150A, or 750° to 950°F with RC-130B was found over the total feed range.

Using carbide tools, temperature rises rapidly with increasing speed. With high-speed steel tools, the temperature rise with increasing speed is not so extreme and compares with that met in machining steels. Temperature rise with increasing feed using carbides is large

enough to be a considerable factor in tool life. Maximum temperature can be held down by using a heavy feed and slow speed.

Machinability of titanium alloys in turning operations is fairly well established.

With a "straight" tungsten carbide tool, 1 hour tool life can be obtained at around 150 fpm (and 0.010 ipr feed) with most of the high-strength alloys. Equivalent speed using a high-speed steel tool is about 40 fpm. The commercially-pure titanium can be machined with carbides at around 300 fpm and with high speed steel at about 150 fpm. These values refer to the turning of a "clean" bar. Skin cuts on rough billets may be extremely difficult. Some of the forging skins may even give trouble depending on the degree of contamination.

High strength titanium alloys and a representative commercially-pure material were used in tool life tests. Each was turned with a carbide, cast alloy and a high speed steel tool. Toward the end of the program, a new titanium material made from consolidated powder became available and was tested.

Tool sharpness is particularly important. A wearland on the flank increases the tendency to chip welding and accelerates tool wear. Rigidity is important. Tool deflection results in increased smearing on the flank. Live centers should be used to avoid seizure of the workpiece.

Negative rakes helpful

Cobalt types of high speed steels gave good results. Cast alloy tools are satisfactory and carbides of the standard designations C-1 through C-4 should be used. Rake angles from 6° positive to 7° negative are satisfactory with carbides; 5° positive rake is successful with cast alloy and high speed steel tools. Others: side cutting edge angle, 15°; relief, 6°.

Eleven different carbides were tried in turning titanium. The harder, straight tungsten carbides proved superior. Indications are that negative rakes are satisfactory and even some-

SPEEDS AND FEEDS FOR MACHINING TITANIUM

Material	Hardness, Bhn	High-Speed Steel		Cast Alloy		Carbide	
		Speed, fpm	Feed, iprn	Speed, fpm	Feed, iprn	Speed, fpm	Feed, iprn
Ti-75A.....	170	90-110	0.003-0.006	120-140	0.004-0.008	160-190	0.004-0.008
RS-120.....	302	60-80	0.003-0.006	90-110	0.004-0.008	120-140	0.004-0.008
RC-130B.....	311	50-70	0.003-0.006	80-100	0.004-0.008	100-120	0.004-0.008
Ti-140A.....	321	50-70	0.003-0.006	60-80	0.004-0.008	80-100	0.004-0.008
Ti-150A.....	341	50-70	0.003-0.006	60-80	0.004-0.008	90-110	0.004-0.008
MST 3A1-5Cr.....	363	.....	.....	50-70	0.004-0.008	80-100	0.004-0.008

what superior to positive rakes. This permits the use of the production-type clamped-in carbides.

Tool life has been obtained over a range of feeds with both carbide and high-speed steel tools. While tool life appears to decay as feed is increased when only time is considered, the cubic inches removed remains practically constant over the feed range: 0.002-0.016 ipr. With the carbide tool, the number of pieces that can be machined is independent of feed, the net result being that a great gain is made in rate of production at no sacrifice in number of pieces per tool grind. With the high-speed steel tool, optimum feed is about 0.010 ipr with a rather rapid loss of tool life (both minutes and cubic inches) at higher feeds.

Chief problem in milling is prevention of cutter chipping and breakage. The short, individual chips characteristic of milling do not fall off but remain "welded" to each tooth as it emerges from the cut. On the next revolution this chip has to be struck off. Often the bond is so strong that the tooth is chipped upon impact.

Best solution is to place the work in such a way that cutter teeth finish their cuts in a direction parallel with the feed. Maximum bite is thus taken at the start of the cut and the "welded-on" section is only a sliver. In slab milling this means a climb cut. In face milling it means lining up the edge of the work with the emerging side of the cutter periphery, a climb cut also.

Relief angle critical

Either carbide or cast alloy tools may be used. Economics will dictate the choice. High-speed steel cutters for good tool life, require ready facilities for resharpening and repairing.

Of all the tool angles, relief is probably the most critical. Less than 10° relief leads to excessive smearing along the flank; much more than 15° weakens the tool and encourages chipping of the edge. Rakes are not critical. Zero axial and radial rakes are satisfactory with cast alloy tools; zero axial and as much as 10° negative radial rake are about right for carbide.

A 30° to 60° corner angle or a large nose radius gives a thinner chip for a given feed and minimizes chipping. It also utilizes a longer cutting edge at a given depth of cut, distributing the force over a greater area. This gives less unit pressure and helps dissipate the heat of cutting.

Heavy feeds appear to yield greater production volume per tool grind, but tool breakage is more frequent. A feed of 0.003 to 0.008 ipt is recommended. Cutting speeds on titanium alloys with carbide cutters can be as high as 100 fpm; higher at lighter feeds. About 50 fpm is reasonable with cast alloy tools.

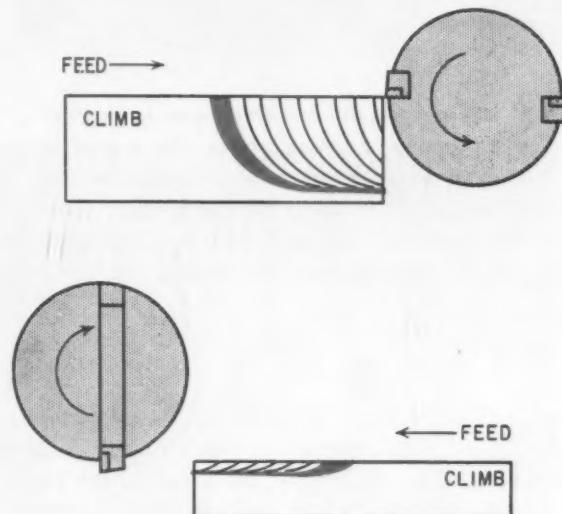
In milling titanium plan the cut so teeth

emerge tangentially. In slab or peripheral milling this means a climb cut with the feed in the same direction as the cutting teeth. In face milling, it means positioning the cutter axis so that the teeth will emerge from the cut on a line parallel with the direction of feed. This procedure has proved to give the best result and the reasoning is that it's better to have the welded-on chip as thin as possible in order to minimize its effect when the tooth hits the work on the next pass.

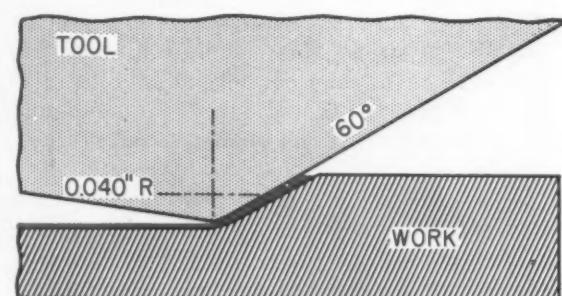
High-speed steel face milling cutters can give satisfactory results. Cutting speeds from 50-80 fpm will give reasonable tool life. Feeds should be between 0.003 and 0.006 ipt.

Cast alloy cutters permit 25 to 50 pct increases in cutting speed and a 25 pct increase in feed. Carbide tools permit 30 pct higher cutting speeds than cast alloy cutters. Both the cast alloy and carbide cutters are somewhat liable to chipping, however, depending on setup conditions.

In face milling cutter diameter should be at least as wide as but not appreciably greater than the width of work however.



CLIMB MILLING, for face and slab cutting gave better results than conventional milling.



THINNER CHIP resulted when nose radius or corner angle was increased. Cutting pressures and tool tip temperatures were reduced.

For large, complex parts—

Low Carbon Stainless Resists Intergranular Corrosion



R. E. Paret

Stainless Steel Specialist
American Iron & Steel Institute

♦ Low carbon stainless steels used in place of more familiar stainless grades offer a solution to some of the problems of intergranular corrosion . . . The lower carbon grades, types 304L and 316L, can be used to replace higher carbon types 304 and 316 in some cases.

♦ LOW-CARBON STAINLESS steels, types 304L and 316L, represent one solution to the problem of intergranular corrosion where processing and application make it likely to occur with higher carbon types. The possibility of intergranular corrosion occurs when chromium carbides are precipitated at grain boundaries by heating the stainless steel to, or cooling it slowly through the sensitizing temperature range of about 800° to 1650°F.

For many applications of stainless steel carbide precipitation is not significant. Applications such as kitchen equipment, architectural uses, food processing and dairy equipment, and auto trim, are not severe enough to cause intergranular corrosion.

However, stainless steels are intended for more severe corrosive conditions. The austenitic stainless steels are capable of resisting very severe corrosives. Their combination of strength, heat resistance, and inertness in severely corrosive conditions, are an advantage in application where nothing less than maximum corrosion resistance can be tolerated.

♦ Carbide formation in lower carbon grades occurs so slowly that normal welding and stress relieving temperatures have no noticeable effect on corrosion resistance . . . Failure of parts too complex or too large for solution treating can often be avoided.

under these conditions intergranular corrosion must be eliminated or at least minimized.

According to the generally accepted theory, stainless steels protect themselves against oxidation and corrosion by formation of an invisibly-thin, passive and nonporous oxide or hydrate film stabilized by the chromium in solid solution in the metal grains. The film is self-renewing under oxidizing conditions. When broken or penetrated, the chromium immediately acts to reform the film, protecting the iron and other elements present from reacting with the oxygen and other elements of the corrosive medium.

In the sensitizing temperature range, chromium migrates to the grain boundaries where it combines with carbon to form chromium carbide. This removes chromium from active duty in the fight to maintain the protective surface film. Areas adjacent to grain boundaries can become sufficiently reduced in chromium to be subject to corrosion which ordinarily the steel would resist. The extent of carbide precipitation is a function of temperature, time at

sensitizing temperatures, and carbon content. This results in lowering of resistance to severe corrosive conditions.

Sometimes stainless steel equipment is intended for service at temperatures in the sensitizing range. If corrosive conditions in service are severe enough, the only solution is the use of a stabilized grade of austenitic stainless steel: Type 321 containing titanium, or type 347 which contains columbium and usually tantalum. These elements are strong carbide formers, their carbides will form in preference to chromium carbides, preventing or minimizing the chromium depletion which can lead to intergranular corrosion.

However, for most equipment fabricated from stainless steel the only exposure to sensitizing temperatures will occur during welding and stress relieving operations. The chromium which precipitates out in carbides during such exposure can be put back in solution by annealing above the sensitizing range followed by rapid cooling. This is often not practical, because of the size or section thickness of the work or because of quenching stresses.

Since time and temperature affect the rate and amount of chromium carbide formation, two solutions present themselves. In the case

HOW CARBON AFFECTS CORROSION RATES.

Steel A*		Steel B**	
Carbon, pet	Corrosion Rate	Carbon, pet	Corrosion Rate
0.018	0.00086	0.024	0.00080
0.022	0.00081	0.028	0.00087
0.025	0.00075	0.027	0.00073
		→	
0.027	0.00105	0.032	0.00171
0.042	0.00620	0.049	0.00550
0.045	0.00520	0.050	0.00780

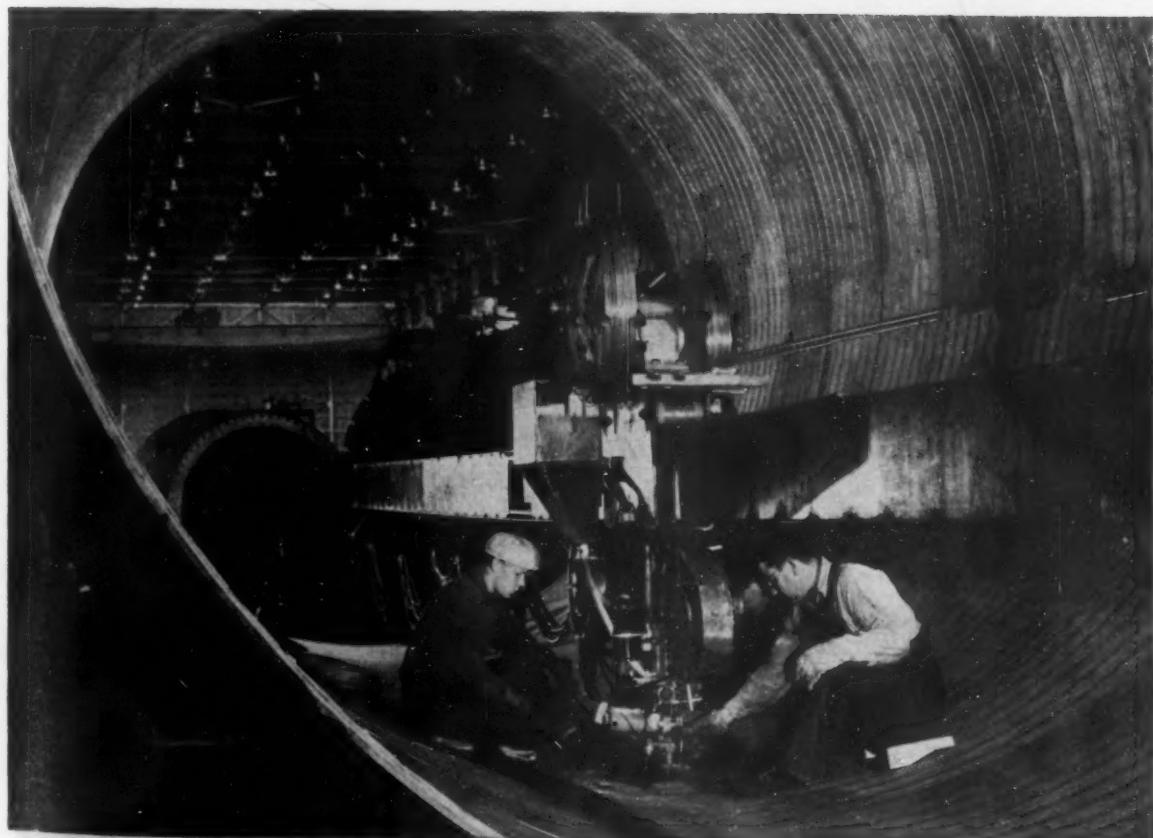
* Steels in this group were: 17.83 to 18.61 pet Cr and 9.921 to 9.97 pet Ni.

** Steels in this group were: 18.22 to 18.57 pet Cr and 10.31 to 10.95 pet Ni.

All samples were heated 10 min at 10.75°F then reheated to 650°F for 1 hr and air cooled.

Corrosion rate: Inch penetration per month in boiling 65 pet nitric acid.

Note the well defined change in corrosion rate at approximately 0.03 pet carbon.



LOW CARBON STAINLESS steels of the 304L and 316L types do not require solution treating after being heated at sensitizing temperatures.

Large fractionating columns such as the one shown here can be automatically welded out of low carbon stainless steels with safety.

**Improvements in melting methods
have made it possible to control
carbon content more closely . . .**

of welding and brazing, the time of exposure to sensitizing temperatures can be minimized by use of air blast or water spray cooling right behind the welding electrode, by backup bars to dissipate welding heat rapidly, or by methods of laying down the welding bead so as to minimize heating of areas adjacent to the weld. Use of a stabilized grade of stainless steel for the electrode protects the weld itself.

In the case of stress relieving, precipitation of carbides can be avoided by treatment below 800°F which is sometimes satisfactory for stress relief.

There are occasions when these methods of minimizing precipitation are not convenient or practical. The equipment being fabricated may be too complex for good production or not sufficiently protective against sensitization.

The third variable is carbon content. For

many years type 304 stainless steel, an 18-8 grade with a maximum carbon content of 0.08 pct, has been available. With this low carbon content the rate of carbide formation on this grade is low and effects of welding or stress relieving on corrosion resistance are sufficiently reduced for many applications. Also, with the carbide formation rate lowered, backup bars or other methods of reducing exposure time are more effective.

More recently, improvements in melting methods and availability of lower-carbon ferro-chromium have made it possible to control carbon content more closely. Thus types 304L and 316L have been added to the list of standard grades of stainless steel. In each of these, carbon is held to a maximum of 0.03 pct. With carbon at this level, carbide formation occurs so slowly that normal welding and stress relieving operations have no noticeable effect on corrosion resistance.

Type 316L, like type 316 contains molybdenum. The molybdenum increases resistance to corrosion by halogens, sulfurous and sulfuric acids, and certain other corrosives which can affect other stainless steels.

COMPOSITION OF LOW CARBON STAINLESS STEEL PCT.

Type	C Max	Mn Max	Si Max	Cr	Ni	Other
304.....	0.08	2.00	1.00	18-20	8-10	.....
304L.....	0.03	2.00	1.00	18-20	8-10	.....
316.....	0.10	2.00	1.00	16-18	10-14	Mo 2.00-3.00
316L.....	0.03	2.00	1.00	16-18	10-14	Mo 1.75-2.50

PHYSICAL PROPERTIES OF LOW CARBON STAINLESS STEEL

	304L	316L
Ultimate Strength, psi		
Annealed.....	80-90,000	80-90,000
Cold-rolled.....	100-180,000	100-150,000
Yield Point, psi		
Annealed.....	35-45,000	35-55,000
Cold-rolled.....	50-150,000	50-125,000
Elongation in 2 in., pct		
Annealed.....	60-55	70-60
Cold-rolled.....	50-10	50-15
Bhn, Bars		
Annealed.....	135-185	135-185
Cold-drawn.....	180-330	180-300
Rockwell, Sheets		
Annealed.....	75-90B	70-90B
Cold-rolled.....	10-35C	10-30C

Low-Cost Tooling Boosts Job-Shop Output

♦ SUCCESS in the molding business is partially due to extensive use of inexpensive power tools. This has been the experience of the MetaMold Aluminum Co., Cedarburg, Wis., where production and quality have been maintained at a high level. Although most of the work done by this firm is on permanent mold castings in aluminum and magnesium, it often does some or all machining on a product.

Much machining is done on inexpensive Delta power tools, such as grinders and drill presses. In addition, an interesting setup of four Rockwell air-hydraulic drill units, mounted on a specially-designed table, is used to drill wheel mounting holes in cast aluminum lawn mower housings.

In setting up the Rockwell machine for production, the casting is fitted over a holding form and secured by four air-powered clamps, one at each corner of the piece. When the start button is pushed, the units begin drilling simultaneously. All four units drill horizontally, and retract separately when the holes are completed. This machine drills 12 holes in about 15 sec. After one production run is completed, the units can be easily converted for a different type of work.

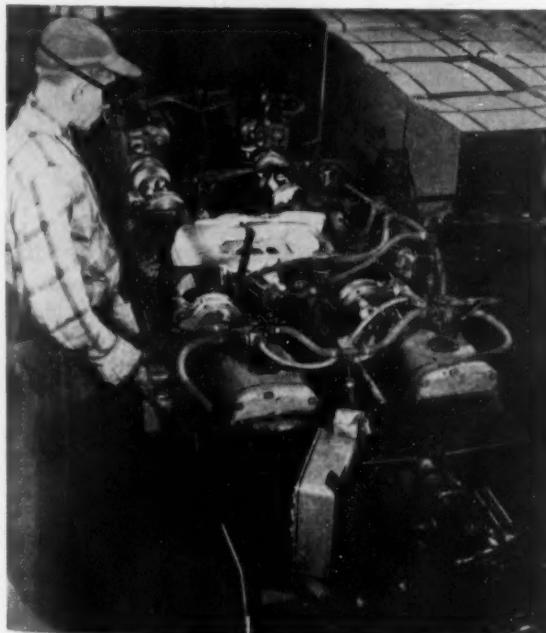


TWO DRILL PRESSES, one inverted, do the reaming and flycutting on aluminum washing machine agitator. Drills are 16-in. Deltas.

Various sizes of drill presses are used effectively in several operations. A 14-in. Delta press with a commander head drills six holes simultaneously in the bottom of a center post for a washing machine agitator. Output on this machine is about 150 pieces per hr. A 17-inch Delta press does several milling operations on small parts.

One of the most interesting drill-press applications is the use of two 16-in. presses, one inverted below the other, for machining a washing machine agitator. With the agitator clamped in place, the bottom press reams the bearing of the agitator. A reduction gear decreases the drill speed for this operation. At the same time, the top drill flycuts the agitator post to bring it down to desired height. The cycle is fully automatic and gives excellent results.

Grinders receive heavy use in many plant operations. One grinder is used for high-speed finishing of cast piston gates at the rate of 250 pieces per hr. Another grinder deburrs and finishes washing machine agitators which were machined in the dual-drill press operation.



SPECIAL MACHINE drills 12 wheel mounting holes simultaneously in cast aluminum housing. Four air-hydraulic units do the job.

Short-Cycle Normalizing Coordinates Tube Mill Production



By J. Kniveton
Vice President
Selas Corp. of America
Philadelphia

♦ FLEXIBILITY in the normalizing lines at Lone Star Steel Co., Lone Star, Tex. has enabled the normalizing production rate to keep pace with maximum mill output of welded tubular products, yet keep thermal pace with reduced mill production. In designing these lines, emphasis was on product quality, economic use of manpower and heat processing which would be an integral part of a high-speed production line.

Planned production of tubular products at this plant is 350,000 tons per year. Its facilities to accomplish this include four basic openhearth furnaces. A slabbing mill, plate mill and hot strip mill produce more than enough rolled strip for two high-speed pipe mills. The No. 1 pipe mill handles pipe from 4½ to 16 in. OD and No. 2 mill is for pipe sizes ranging from 1.90 to 6.625 in. OD.

Welding speeds of the No. 1 pipe mill range from 40 to 120 fpm and those of the No. 2 mill are 50 to 150 fpm, depending on the gage of pipe. These welded speeds require normalizing production rates of 3000 and 1500 lb per min, respectively, with forward speeds synchronized with the welding speeds.

Considering the high production rate, the Selas Corp. of America, Philadelphia, was asked for recommendations on suitable in-line continuous furnace equipment for the two pipe mills. One requirement was that the equipment

♦ Short-cycle normalizing equipment keeps pace with two high-production tube mills in which welding speeds range from 40 to 120 fpm and 50 to 150 fpm . . . It also stays in thermal pace at reduced mill production . . . Equipment takes about one third the floor space needed for conventional furnaces.

♦ Continuous in-line normalizing takes 66 sec by the short-cycle method . . . By comparison, conventional methods take 6 min to heat from room temperature to 1650°F, plus 15 min holding time . . . Pipes are clean and free of oxide . . . The 33 barrel furnaces in each line have seven zones of automatic temperature regulation.

be capable of heat treating in pace with pipe mill production.

The full normalizing of all welded pipe is necessary to obtain the physical and metallurgical properties specified for oil country operation. The first decision, based on welding speeds, was to install normalizing equipment for each pipe mill. If pipe was raised to the normalizing temperature, then held for a period of time, large, bulky furnace equipment would be required. Floor space to accommodate such equipment would be extensive.

Requires less floor space

Experience of the Selas Corp. with Gradation heating, using rapid transfer of gas radiant energy to the product, indicated that short cycles could be used. Tests were conducted to determine the shortest operating cycle which would produce satisfactory normalized welded tubing.

Comparative layouts show that the new furnace line requires only 2805 sq ft of floor space whereas conventional furnace equipment requires 8400 sq ft, or about three times as much. Moreover, the equipment provides the labor saving feature of in-line design. In a tube mill, continuous in-line design also has other definite advantages.

Total furnace length of the multiple furnace line is 240 ft. This length is divided into

seven control zones. Each zone is an independent unit. When production is reduced, furnace sections can be completely shut off to avoid burning excessive fuel.

Several sources supplied samples of as-welded tubing which were heated and tested. The tests proved that a tube uniformly and rapidly heated to a temperature in the range of 1650° to 1700°F produced full solution of the carbon and complete recrystallization of the heterogeneous grain structure throughout the pipe and especially in the weld area.

Tensile and hardness tests were made on low-carbon tubing having a 4-in. OD and an 0.125-in. thick wall. In one case, the tubing was normalized by a conventional method in which heating from room temperature to 1650°F took 6 min, then was held at that temperature for 15 min. By comparison, heating from room temperature to 1650°F by the Gradiation short-cycle method took 66 sec. The finer grain resulting from short-cycle normalizing produces higher hardness, strength and yield-tensile ratio with but slight lowering of ductility.

Normalized tubing produced by the gas radiant heating method withstands flaring, flanging and crushing tests up to limits specified by the American Petroleum Institute without splitting at the weld. Heat processing of the 4-in. OD tubing is done at 90 fpm which is equivalent to the welding speed. At that heating rate, only 2½ lengths of 40-ft tubing are in the line at one time.

TENSILE AND HARDNESS TESTS

(Low-Carbon Steel)

Location	Yield Strength, psi	Ultimate Strength, psi	Elongation, Pct in 2 in.	Hardness, R _b
As-Welded Tube				
At Weld	.....	.....	.....	84
A	26,750	52,500	32.3	66-68
B	27,500	54,570	31.9	74-75
C	27,080	65,160	33.5	74-76
D	27,270	55,400	32.2	71-71
E	30,000	60,000	18.5	79-83
Normalized 1650°F—15 Minutes				
At Weld	.....	.....	.....	50
A	27,906	45,580	47.3	42-45
B	33,460	48,980	43.5	49-50
C	34,130	48,940	40.0	52-54
D	36,040	49,850	43.5	54-57
E	39,080	50,000	45.4	48-53
Short-Cycle Normalizing Treatment				
At Weld	.....	.....	.....	59
A	41,430	49,380	44.0	48-54
B	41,770	53,100	38.0	55-60
C	43,970	53,940	37.0	57-61
D	42,110	52,980	37.0	55-58
E	43,290	53,600	38.0	56-60

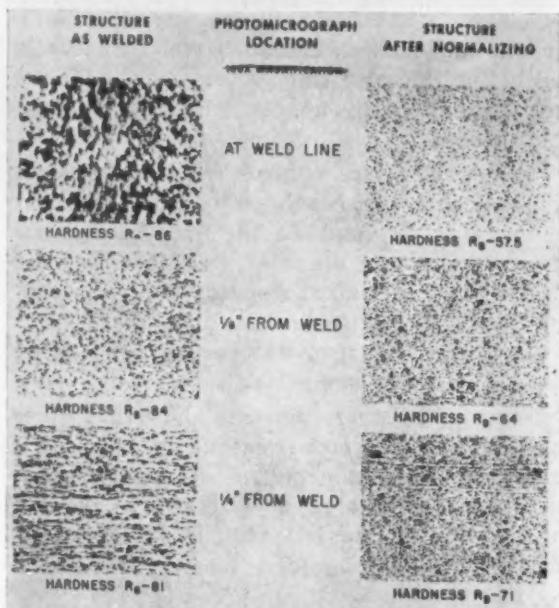
CONVENTIONAL FURNACE-6400 SQ FT



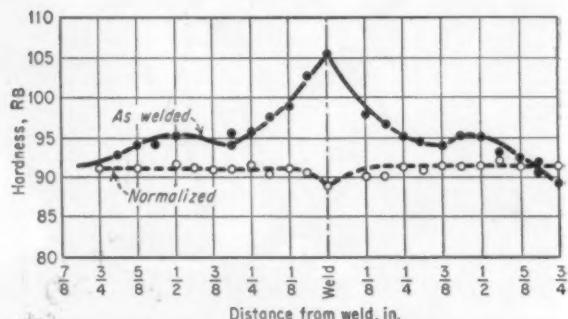
GRADIATION LINE-2805 SQ FT



IN-LINE short-cycle normalizing requires about one third the floor space, yet production capacity is much greater. In a tube mill layout, continuous processing is highly advantageous.



MICROGRAPHS of electric welded ASTM A-178 Type C tubing show homogeneous grain structure after short-cycle normalizing at about 1650°F.



HARDNESS survey reveals uniformity in vicinity of weld after short-cycle normalizing. Tube contains 0.24 pct C and 1.15 Mn.

The same size tubing produced at the same welding speed would have 47 lengths of 40-ft tubing in conventional furnace equipment at any one time because of the 6-min heating and 15-min holding period. The limited number of

The 33 barrel furnaces have seven controlled temperature zones . . .

tubes under heat in the short-cycle method results in minimum surface oxidation and a cleaner product.

The cleanliness and freedom from oxide can be detected by the shine of the tube as it egresses from the furnace opening. The directed radiant gas heat completely envelops the tubing within the barrel furnace structure.

Broad specifications, in respect to the large number of tube diameters and wall thicknesses with corresponding difference in tube weight, require each normalizing line to be mechanically and thermally flexible. Ability to operate efficiently at reduced mill capacity is of paramount importance. The 33 barrel furnaces in each line, incorporating seven zones of automatic temperature regulation, meet mill requirements.

The temperature control for the first four zones in each line regulates the group chamber temperature to establish the temperature gradient for the tube diameter, wall thickness and the process normalizing speed. The remainder of the multiple furnace line uses three zones of control but the temperature sensing elements sight directly on the heated tube.

Temperature measurements show that tubes are heated uniformly from end to end. As a check on the tube temperature, another temperature sensing element is located at the discharge end of the last furnace. This is connected to a recorder for a temperature record

on each tube passing through the normalizing lines.

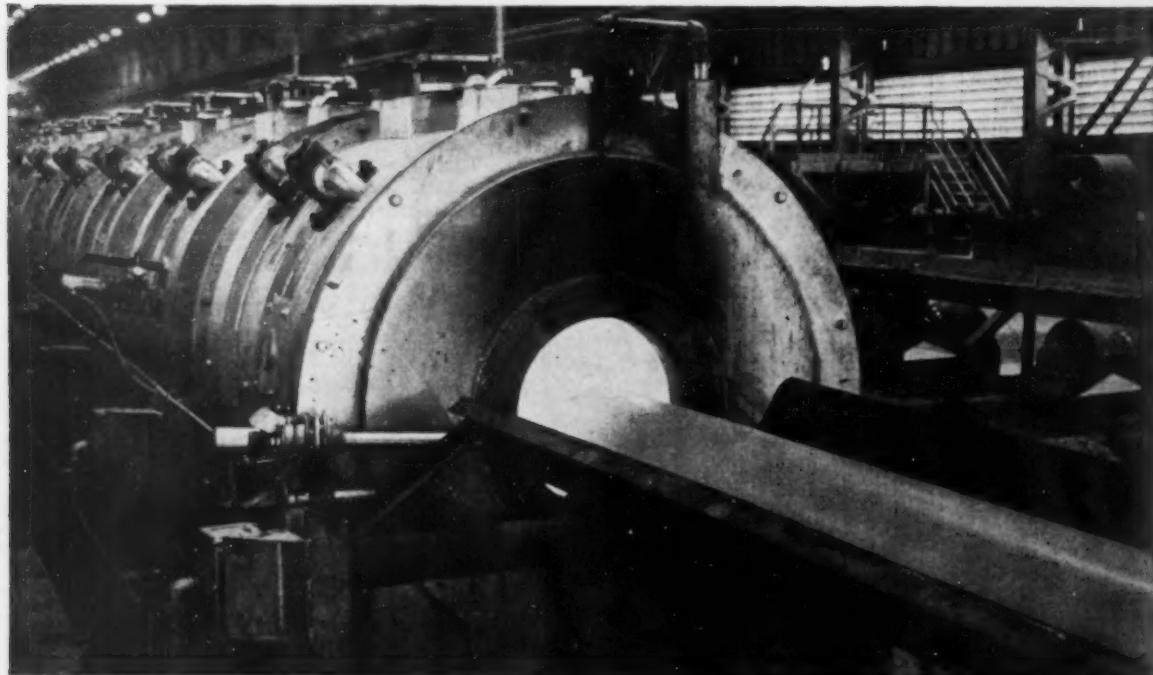
Multiple furnaces, in straight-line formation and controlled in groups, are highly efficient. Each controlled zone functions only at its selected and adjustable maximum capacity when a tube is passing through the control zone. When tubes are not in the control zone, gas flow is at minimum volume to regulate the chamber temperature selected for the size tube being processed.

Since individual chambers are small, fuel requirements to hold the chamber temperature are low compared to conventional furnaces. Response to selected maximum fuel demand through the control regulation is rapid due to compactness of the individual furnaces and proximity of the sensing element to the work.

When tube production is reduced, conventional furnaces of massive design require more fuel per ton of product because of large radiation losses. The multiple-chamber Gradiation line, under the influence of several control zones, operates with one or more entrance zones completely shut off. Also, forward tube speed is reduced when the mill operates at reduced capacity.

Because of design flexibility, the normalizing lines can be termed in speed-pace with maximum mill production, but also in thermal-pace with reduced mill production.

After many months of operation, tubular products normalized by the short-cycle method have been of exceptionally high quality. The tubing is clean when discharged from the furnace line because exposure to maximum temperature is short.

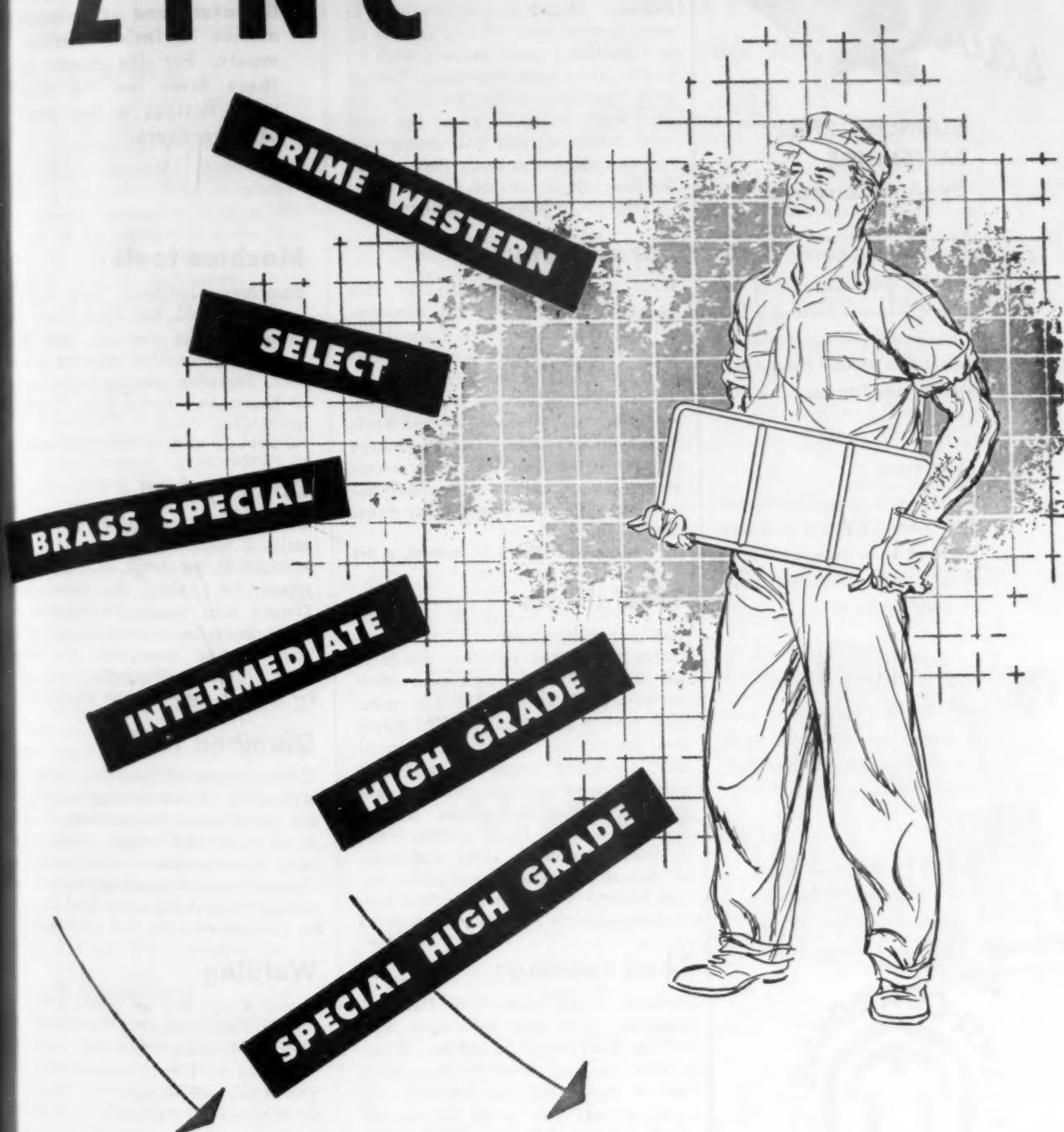


FINAL CHAMBER of 33 furnace normalizing line discharges clean, oxide-free tubing. Radiant gas

heat completely envelops the tubing within the barrel furnace structure.

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for urgent military and
civilian requirements



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Castleton-on-Hudson New York

FREE Technical Literature

Tool holder

Descriptive brochure and price and specifications sheet describing Brookfield Tool Holder has been issued by company. Holder is now available in eight models with holding ranges up to 1 in. Doing away entirely with all costly and time-consuming fussing with bushings, holder makes set-up time what it can be under the most ideal conditions and guarantees perfect tool alignment every time and on the first try. *Brookfield, Inc.*

For free copy circle No. 1 on postcard, p. 145

Spray system

With a Camaco Electric-Air Hot Spray Unit you control the temperature of your material as it should be done, with accurately regulated temperature of air at the spray gun. Air temperature is closely regulated by a specially designed control and heating circuit. In most cases no change in your present equipment is necessary. Camaco unit can be added between your regulator and spray guns. *Capitol Machine Co.*

For free copy circle No. 2 on postcard, p. 145

Steel sheets

Newly published 4-p. bulletin illustrates perforated patterns available for shipment from stock, and other patterns supplied perforated to order from carbon and stainless steel sheets and plates, for safety, ornamental and screening purposes, and for manufactured articles such as cabinets, radiator enclosures, special shelving, baskets, trays, grilles. How-to-order information along with typical layout covers all specification details. *Joseph T. Ryerson & Son, Inc.*

For free copy circle No. 3 on postcard, p. 145

Lead coating

Blakled, a new product of chemical research, is a rust preventive lead coating but is not a paint. When applied to any steel surface, dry, wet or rusty, Blakled displaces the moisture and fills in all the minute pores and cavities in the surface with strong adhesion to the metal. Blakled can be used by itself to protect steel from rust or as an under-coat to provide a perfect primer for any industrial paint. *U. S. Steel Supply Div., United States Steel Corp.*

For free copy circle No. 4 on postcard, p. 145

More Literature Available

Many companies offer free literature and other information in their advertisements. For the names of these firms see the company listings in the index of advertisers.

Machine tools

Emerman Machinery Corp. has released its 1954 Red Book which contains a listing complete with illustrations of machine tools for sale or rent. Included also is a description of Emerman's rental plan. *Emerman Machinery Corp.*

For free copy circle No. 5 on postcard, p. 145

Dock system

Pamphlet gives illustrations and details of how truck lines are saving \$700-\$1000 per week in freight terminal by using the mechanized freight dock system. Advantages of Webb underfloor towveyors and overhead towing conveyors are listed fully. *Jervis B. Webb Co.*

For free copy circle No. 6 on postcard, p. 145

Diamond tools

United Diamond Tool Corp. presents a preprint of new catalog which lists the most recent information on Diamond tools and wheels which company manufactures. Reference charts, dimensions and specifications are included. *United Diamond Tool Corp.*

For free copy circle No. 7 on postcard, p. 145

Welding

Taylor Forge & Pipe Works is offering In-Plane Bending Properties of Welding Elbows which was recently presented at the annual meeting of The American Society for Mechanical Engineers. Purpose of the paper is to provide design engineers with accurate, experimentally derived flexibility and stress intensification factors applicable to welding elbows commonly used in high pressure steam, oil refinery and gas compressor station piping systems. *Taylor Forge & Pipe Works.*

For free copy circle No. 8 on postcard, p. 145

and Catalogs

Turret lathe

Informative bulletin on Potter & Johnston Co.'s 5-D2 Power-Flex Automatic Turret Lathe has been issued. Illustrations, design data sheet, complete speed and feed range tables and dimensions are included. *Potter & Johnston Co.*

For free copy circle No. 9 on postcard, p. 145

Chip separator

Machine screws, screws, nuts, studs, cartridge shells, and other parts produced by automatic screw machines are quickly separated from metal chips by McKenzie Chip Separator. The machine separates a day's production of an automatic screw machine in minutes. Separator is equipped with a self-feeder, a vibrator, and a centrifugal blower unit. *McKenzie Engineering Co.*

For free copy circle No. 10 on postcard, p. 145

Mycalex plates

Precision-molded G-E mycalex plates, capable of withstanding the tremendous impact caused by discharge of 100,000 amperes, have permitted a 20 per cent improvement in protection level for the company's new Thyrite Magne Valve arrester. G-E mycalex forms an integral part of the arrester's revolutionary gap unit design. *General Electric.*

For free copy circle No. 11 on postcard, p. 145

Thermocouples

New edition of 36-p. bulletin, *Thermocouples and Accessories*, has just been issued. Listed, with specifications, are standard thermocouples for all applicable temperature ranges. Separate sections are devoted to tubular-type iron-constantan couples, wire-type iron-constantan and copper-constantan couples, and Chromel-Alumel alloy and platinum couples. *Foxboro Co.*

For free copy circle No. 12 on postcard, p. 145

Stock handling

Acme sheet stock handling system operates very much like a library. When a crate of sheet is received it is placed on a welded steel transfer rack. Thereafter all handling is performed by the plant's overhead traveling crane. No longer is it necessary to divert a work force to grapple with piles of crates to uncover material needed for production. This system cuts handling costs in small plants as well as large. *Acme Welding Div., United Tool & Die Co.*

For free copy circle No. 13 on postcard, p. 145

Turn Page

WHAT'S THE BEST WAY
TO APPLY ZINC PHOSPHATE
COATINGS TO STEEL?

OAKITE CRYSCOAT HC
DOES A FINE JOB FOR US*

*This comment came from a Pennsylvania munitions maker, who added that Oakite CrysCoat HC has put an excellent zinc phosphate coating on 385,000 shells with "absolutely no trouble... maintenance and control are very easy." The Oakite CrysCoat HC coating on steel products—such as artillery shells, rocket fins, auto parts, etc.—weighs more than 200 milligrams per square foot. It more than meets the requirements of U.S. Government Specifications:

JAN-C-490, Grade 1

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PA-PD-191, Rev. A

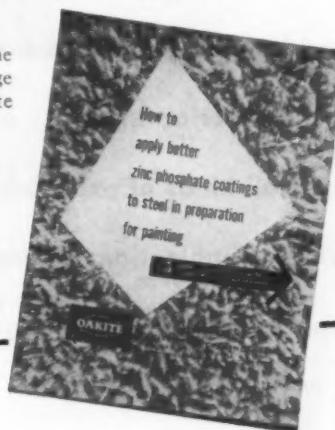
The Oakite CrysCoat HC Process for preparing steel for painting—either in spray-washing machines or in tanks—has five big advantages:

- 1 The heavy CrysCoat HC coating forms a strong foundation for the lasting adhesion of paint. See page 5 in free booklet.
- 2 The heavy coating gives excellent protection against electrochemical corrosion. See page 7.
- 3 The CrysCoat HC Process is easy to control. Only one material is used for make-up and up-keep. No accelerators, starters, toners or other additives are needed. Only one simple type of titration is used. See page 9.
- 4 The CrysCoat HC reaction produces relatively little sludge and scale. See page 10.
- 5 Stainless steel is not necessary for all parts of the equipment. See page 11.

FREE For complete information, mail the coupon for a copy of our 12-page illustrated booklet describing the Oakite CrysCoat HC Process.

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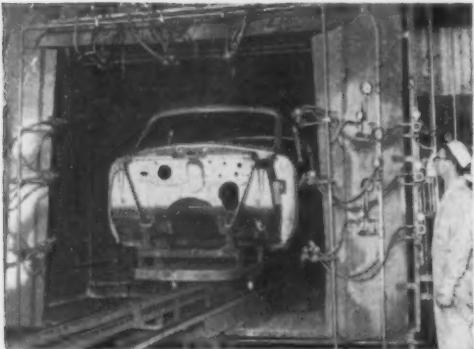
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Electro-Spray



Automatic electrostatic spray enables Studebaker to apply a heavier and more uniform primer surface while giving them a net saving of 1.81 per body in paint and direct labor. Not only is the Ransburg method providing the desirable increase in uniform film thickness, but it is enabling Studebaker to paint more bodies per hour with the substantial savings in paint and labor over the former hand spray method.

The heavier, and enduring, first coat on Studebakers provides the necessary base for the superior finish . . . a finish which resists all kinds of exposure conditions, such as combinations of warm and humid climate, and prolonged bright sun exposure.

Whatever your product may be—large or small—if your production volume justifies conveyorized painting, chances are that one of the RANSBURG electrostatic processes can do the job better, and for less. Write or call for data and detailed information on numerous and varied installations.



Ransburg
ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

Free Technical Literature

Continued

Belting

Illustrated 24-p. engineering handbook on elevator belting has just been published. It describes and illustrates types of belt bucket elevators, gives factors for belt selection, outlines procedures for engineering the correct belt and describes belt construction features. *B. F. Goodrich Co.* For free copy circle No. 14 on postcard, p. 141

Belt conveyors

Belt conveyors of heat resisting cast alloy are described in 4-p. bulletin. Standard Cast Alloy Belt Conveyors are available in 18-24-28-30-36-38-40-48 and 60 in. widths for all types furnace requirements and can be built in comparatively long spans, operating in temperatures up to 1800° F. *Standard Alloy Co.* For free copy circle No. 15 on postcard, p. 141

Plating machines

Recent bulletin on Automatic Rack Type Plating equipment gives descriptions and illustrations of Stevens machines. Many of the special applications that these machines are capable of handling such as heavy duty cleaning and pickling and automatic bright dipping are also illustrated. *Frederic B. Stevens, Inc.* For free copy circle No. 16 on postcard, p. 141

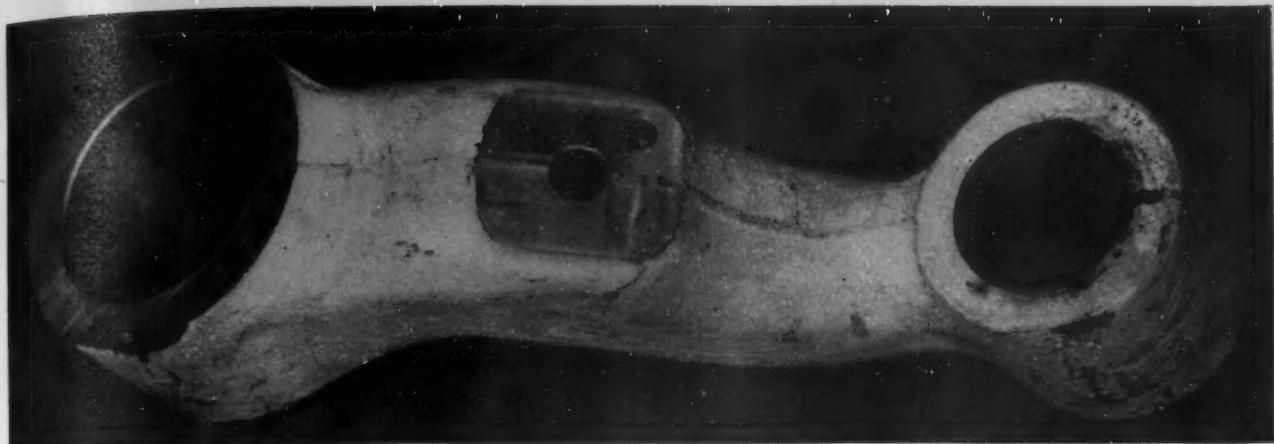
Hoists

Information on Safety-Pull Ratchet-Lever Hoists is now available from Coffing Hoist Co. Bulletin describes the entire line of ratchet-lever hoists including both roller and coil-chain models, with capacities ranging from $\frac{1}{4}$ to 15 tons. In addition to features, specifications and special hooks, bulletin illustrates ratchet-pawl construction that eliminates friction brakes. *Coffing Hoist Co.* For free copy circle No. 17 on postcard, p. 141

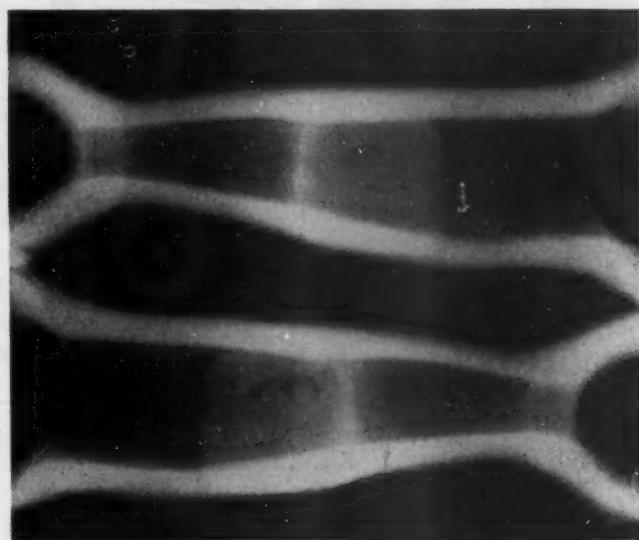
Flame cutting

Advanced Automatic Flame Cutting for Machinery Weldments is title of booklet released by Air Reduction Sales Co. Reprinted from *The Welding Journal*, this article relates how the Marion Power Shovels Co. converted from castings and riveted structures to weldments and discusses the problems involved in making this change, tracing the development and utilization of chain type flame cutting in the fabrication of these units for power shovels. *Air Reduction Sales Co.* For free copy circle No. 18 on postcard, p. 141

Turn Page



Ankle Bone for tons of tank—



RADIOGRAPHY proves it sound

It's the support for the track wheel of a tank—a tough job if there ever was one. Failure would mean complete disablement.

With soundness so vital, every casting was radiographed. It's the one way to prove that no hidden flaw exists without destroying the part.

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ently good work. This is why it is more and more becoming a routine procedure in many foundries.

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These extras are in addition to all other applicable extras.

SIZES	COLD DRAWN GROUND AND POLISHED		TURNED GROUND AND POLISHED		TURNED AND POLISHED	
	Free Machining Grades Sulphur .08% min. - not Furnace Treated	Non re- sulphur- ized Grades Sulphur under .08% or Furnace Treated	Free Machining Grades Sulphur .08% min. - not Furnace Treated	Non re- sulphur- ized Grades Sulphur under .08% or Furnace Treated	Free Machining Grades Sulphur .08% min. - not Furnace Treated	Non re- sulphur- ized Grades Sulphur under .08% or Furnace Treated
3/8" to less than 7/16"	\$9.10		\$10.20			
7/16" to less than 1/2"	7.70	8.55				
1/2" to less than 9/16"	6.60	7.35				
9/16" to less than 5/8"	5.45	5.95				
5/8" to less than 11/16"	4.95	5.50				
11/16" to less than 13/16"	4.35	4.80				
13/16" to less than 15/16"	3.65	4.10				
15/16" to less than 1 1/8"	3.20	3.55				
1 1/8" to less than 1 7/16"	2.50	2.80	\$4.80	\$5.35	\$2.25	\$2.50
1 7/16" to less than 1 15/16"	2.15	2.40	3.90	4.45	1.70	1.90
1 15/16" to less than 2 1/4"			2.55	2.80	1.20	1.30
2 1/4" to less than 2 15/16"			2.45	2.65	1.15	1.25
2 15/16" to less than 3 3/16"			2.00	2.20	.70	.80
3 3/16" to less than 3 13/16"			1.90	2.10	.65	.75
3 13/16" to less than 4 1/16"			1.90	2.05	.60	.70
4 1/16" to less than 5 15/16"			2.20	2.35	.55	.65
5 15/16" to less than 6 1/2"			2.30	2.45	.65	.75

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Copperweld also offers LEDLOY* and leaded steel alloy in a variety of sizes and surface conditions, including cold finished bars, annealed or heat treated. Bar finishes include cold drawn, ground or turned and polished, within our range of manufacture. Semi-finished products such as billets and blooms are also available for re-rolling or forging purposes.

*Inland Ledloy License

SIZE

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Carbon Range
over .55% or
Heat Treated

.006"
.008"
.010"
.012"

.006"
.008"
.010"

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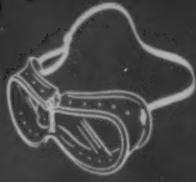
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Technical Briefs

Engineering

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MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.

Welding:

Center sills welded with multiple electrode setup.

A multiple-electrode welding operation has replaced the single-electrode setup formerly used by the Chicago, Burlington, and Quincy Railroad for the fabrication of center sills for all-steel box cars.

Plant officials, at the Havelock, Nebraska shop, working with Unionmelt Oxweld Railroad Service men, decided to try submerged melt multiple-electrode welding for fabricating center sills. The use of two electrodes, in transverse position was so successful, the company plans to use the installation on a permanent basis.

Use Large Jig

The center sills are welded on a jig which has been constructed from an old 50-ft center sill, cut and spaced for the inside diameter of the sills being welded. Twenty-six 10-in. air brake cylinders, spaced along the length of the jig, control the air clamps on the sides of the jig.

The 3-in. camber of the sills is



Weld area protected . . .

IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 145. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

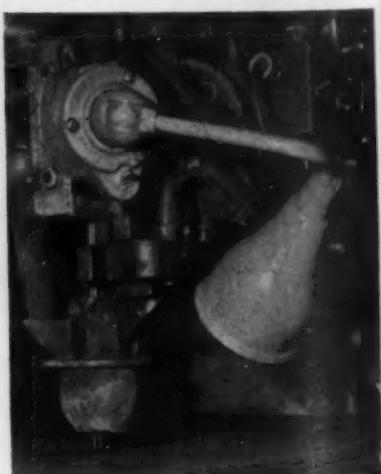
pulled down by clamps which are controlled by two 24-in. cylinders at each end of the jig.

Connected In Parallel

The 40-ft weld is completed in 10 minutes using a modified Unionmelt UE Welding Head mounted on a CM-37 carriage. The UE Head with the electrodes connected in parallel, was specially adapted for this job.

The weld area is protected from the atmosphere by Unionmelt Grade 50 composition which is fed to the working surface from a hopper located above and to the left of the welding head.

The clean, strong weld is completed in one pass and requires a minimum of finishing. These $\frac{3}{8}$ -in. mild steel center sills can now be combined with the rest of the all-steel parts to form durable box cars.



Note two electrodes . . .

and Production Ideas

Inventions:

If you're planning to get a patent, here's expert's advice.

What an invention is, and what makes an invention patentable depends on established principles which must be considered in developing any new idea, according to Carl F. Sibbe, engineer and attorney of General Motors Corp.'s Patent Section, Central Office, Detroit.

Invention has been defined in various ways but, in the broad sense, it generally is understood to be the creation of something which did not exist previously. It does not include the revelation of something which exists but was unknown.

The discovery of a law of nature or a scientific principle, therefore, is not regarded as constituting invention even though it had remained unknown until revealed by the one making the discovery. Invention is the requirement which constitutes the foundation of the right to obtain a patent—the other requirements being that the invention must be (a) new, (b) useful, (c) fully disclosed, and (d) must never have been abandoned.

To Complete an Invention

In order to satisfy the statutory requirements governing the grant of a patent, the invention must be reduced to practice. The inventive idea alone is insufficient, no matter how completely it may have been formulated in the inventor's mind.

It also must be presented in some physical form and proven to be successful or embodied in a patent application and filed at the United States Patent Office before the invention is recognized as having been completed.

Must Show Performance

Certain definite acts must be performed before the actual reduction to practice of an invention

Turn Page

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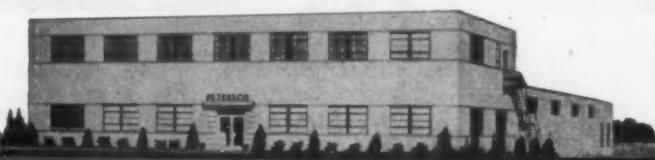
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Technical Briefs

**Application for patent
should be filed ...**

is recognized. For example, if the invention is to be applied to an automobile it must be installed on an automobile and must perform successfully under operating conditions to satisfy the requirements regarding an actual reduction to practice of such a device.

Thus, either an actual reduction to practice of an invention or the filing of a patent application, which is considered to be a constructive reduction to practice, constitutes a satisfactory method of completing an invention.

If Two Inventors Claim

It often happens that two or more persons, working entirely independently of each other, may make the same invention. Since a patent may be granted only to the first inventor, when two or more applications embodying such an invention are co-pending in the Patent Office, an interference is declared and a definite procedure, regulated by the Rules of Practice of the Patent Office, is followed to determine the first inventor.

The burden of the proof is on the inventor whose application was filed last. If the inventor who filed last was the first to conceive the invention, in order to be successful in the interference, he must prove that he worked diligently towards reducing his invention to practice from the time just prior to the conception date of the other invention until his own invention was either physically reduced to practice or until his application was filed in the Patent Office.

Must Complete Invention

Hence, if the inventor whose application was filed last is unable to prove such diligence then the other party will be awarded the patent even though his conception of the invention was later. It therefore, is important to exercise the utmost diligence in completing the invention by reducing it to

Turn Page

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Technical Briefs

practice by either or both of the methods described.

Patentable Inventions

The line of demarcation between invention and non-invention often is difficult to ascertain. Generally speaking, if the new device produces a new result or an old result in a new or more efficient manner, it is regarded as involving invention and may be patented.

There are a number of rules that may be employed to test the patentability of a new invention. Like most other rules, there are a number of exceptions and, consequently, there is no definite test that could be applied with any degree of certainty to all situations.

Consider On Merits

Each invention, therefore, should be considered on its own merits and, even though the device constituting the new invention may not be materially different from other known devices, the differences between them may be highly significant in so far as the results obtained are concerned and may fully satisfy the requirements relating to patentable inventions.

Since invention is the creation of something which did not previously exist, the disclosure of an invention contained in a patent adds to the knowledge of the world. The patent bears the name of the inventor and is a permanent record of his achievement.

Benefit Public

Copies of United States patents are on file in most countries throughout the world and constitute a source of invaluable information. Patents, therefore, not only benefit the inventor or his employer but also benefit the public-at-large since it has access to an ever-growing wealth of information.

After expiration of a patent the public may adopt the invention disclosed therein in its entirety. It is because of such benefits that flow to the general public that our patent system was founded.

Metal Finishing:

Felts find wide use in industry for finishing operations.

Wool felt is being used more and more for finishing and polishing the newer industrial, as well as the older traditional metals, according to the Felt Assn. of New York.

Felt bobs and wheels in a full range of densities and hardnesses aid in precision finishing, grinding, polishing and buffing in the metals industry. The uses include finishing of airplane parts, polishing of copper engraving plates, cleaning and polishing of saw steel, propeller blades, cutlery, chromium plate, tubing, and many others.

Wheels Are Job Designed

Felt must be specially engineered for such uses. In addition to elasticity, felt can be coated with abrasive grains to do a specific finishing or polishing job. Wheels 6 in. and more in diameter are made to rigid specifications in nine densities and can be operated at speeds up to 9000 sfpm.

The felt industry has also developed, standardized, and is making a wide range of felt bobs for precision polishing operations.

To surface polish copper plate for etching, felt sheets are



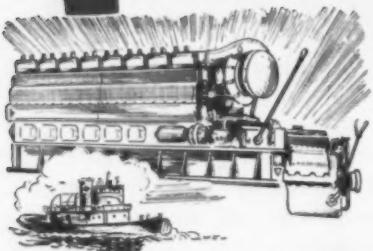
Finishing piston rods . . .

Turn Page

For DEPENDABILITY



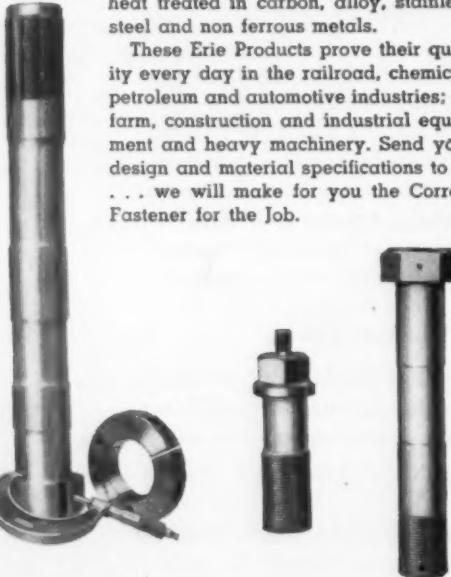
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—Technical Briefs—

mounted on large cylinders. In finishing recesses in dies for drawing sheet metal, felt bobs are used. Wheels made of rock-hard compressed felt are used for polishing small diameters prior to chrome plating.

The hornlike character of wool fiber makes it possible to favor the harder felts for polishing soft materials. For polishing harder materials, felt wheels act as carriers for liquids in which abrasive substances are dispersed.

About 85 pct of the felt wheels for surface polishing are called "set-up" wheels. The wheels are coated with glue and rolled in selected grits to form a somewhat permanent abrasive tool similar to an emery wheel.

Sheet Felts Standardized

Mechanical sheet felts contain precisely standardized materials for metallurgical finishing and polishing. Felt manufacturers have adopted standards and are adhering to them closely.

The standards cover four classes of sheet felts: Fine Spanish, Spanish, Fine Mexican, and Coarse Mexican. The first two are finer types while the latter two are coarser fiber varieties. Each type is made in five different degrees of density: extra-soft, soft, medium, hard, and rock-hard.

The extra-soft Mexican type, is used to polish aluminum, copper,



Removing the burrs . . .

Turn Page

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For example, one Zincilate coating was developed for use in a restricted plant area where solvents were not permitted—this one can be used without any chemical cleaning of the metal. Another is designed for products subject to continuous water immersion—this one is being used by a manufacturer of commercial dishwashing units. Still others were developed for use in plants without baking facilities, others for use as a base for color coatings.

If you'll tell us your corrosion problem, we'll tell you which Zincilate formulation provides the proper solution.

If none of the twelve now available will do the job, we'll tell you so frankly and, if you wish, we'll work with you developing a new formulation that will do the job! Better still, send along a sample part of your product—we'll coat it with the correct Zincilate formulation and return it to you for further tests. Naturally, there's no obligation!

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Condensed specifications and characteristics of twelve Zincilate formulations, prepared in tabular form for quick, easy comparison.



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Technical Briefs

Deep drawing dies are given final polish . . .

zinc, and for wiping sheet steel during manufacture. At the other end of the density range, the extra-hard Fine Spanish sheets are cut and turned into wheels and bobs for grinding and polishing metals and other materials, including dentures, glass tumblers, jewelry, leather, and other items.

Applications Vary Widely

Deep drawing dies, combustion chambers for automotive engine, and diverse products as lipstick holders and darning needles are given a final surface finish with bobs or wheels.

In polishing metal cylinders, felt strips are inserted in metal channels and the edge grain of the strip is used rather than the surface. A Spanish sheet felt for this job because is hard, has plenty of life, and can hold grinding or polishing compounds.

For precision polishing of propeller blades, an extra-hard Mexican sheet felt makes a good base for carborundum abrasives. Cutlery is polished between rotating felt rollers with fine pumice as the polishing medium.

Soft Wheel for Aluminum

Chromium-plated automobile grilles often become contaminated with body paint and require cleaning. Backcheck felt, made up in rolls, is ideal for such jobs. It is extra firm and lint-free, gives a scratch-free finish and can be easily cleaned for reuse.



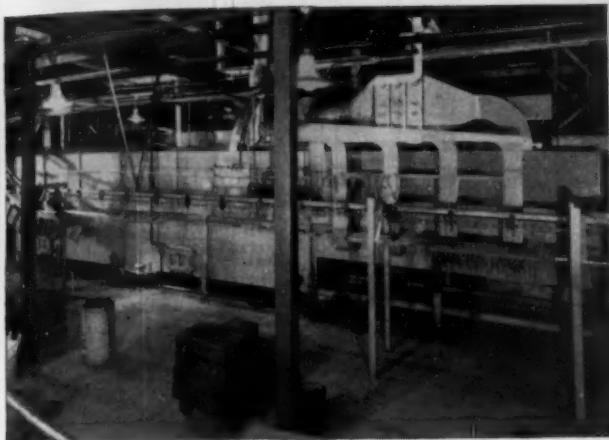
Polishes the inside . . .

Turn to Page 162

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Technical Briefs

Backchecks are also used for wiping brass and steel strips, and for cleaning metals before plating.

Aluminum is polished by the same procedure as other metals. However, it is done at lower wheel-to-metal pressures. Finer abrasives, with a more gentle cutting action, are used. Roughing requires wheels faced with abrasives of 50 to 100 grit.

Greasing Treatment

In aluminum finishing, greasing or oiling is a refined roughing procedure. A soft felt wheel is used with 100- to 200-grit aluminum oxide or emery, plus tallow or beeswax to prevent overheating. Peripheral speeds are about 6000 sfpm. Sand castings are invariably given this greasing treatment after roughing. Diecastings are given it as the first polishing operation.

Copper gets its mirror-like finish by buffing, using very fine, soft abrasives such as rouge, crocus, tripoli or lime, with a wheel of felt. The buffing compound is prepared by mixing the abrasive with stearic acid and tallow, then forming it into a bar or cake.

Fulling Makes Denser Mat

All felt polishing wheels and bobs are made of nothing but wool. Manufacturing involves hardening and extensive fulling, a mechanical process of kneading the wool fibers under controlled conditions of heat, pressure, moisture and lubrication.



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Turning to size . . .

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—Technical Briefs—

Methods:

Stud welding gun solves tough assembly problem.

Manufacturers of color television tubes found the answer to a perplexing problem in a lightweight semiautomatic stud-welding gun that saved shipbuilders an estimated 100 million manhours during World War II.

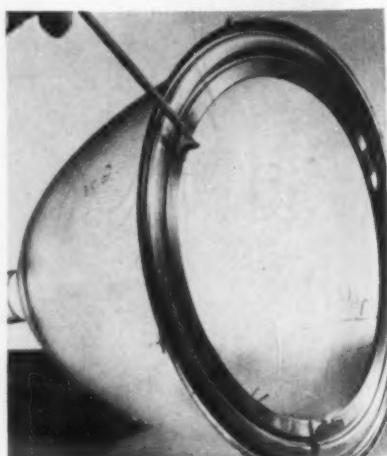
Development engineers of both Corning Glass Works and the Kimble Glass Co. turned to the Nelson stud welding gun as the best means of installing the heavy color screen assembly between the funnel and the face plate of the finished tube.

Gives Required Accuracy

Since picture quality depends in large part upon the accuracy with which these built-up color packs are suspended with relation to the "firing point" at the base of the funnel where the picture-forming electron beams are released.

The most practical method was to install nesting flanges of very thin metal on both the funnel and the face plate.

Wafer-thin pads are then resistance-welded to the funnel flange at the stud locations and the controlled stud welding operation follows. After the screen has been mounted on the studs and secured with nuts, it is permanently covered by the face plate.



Studs provide support ...

Turn Page

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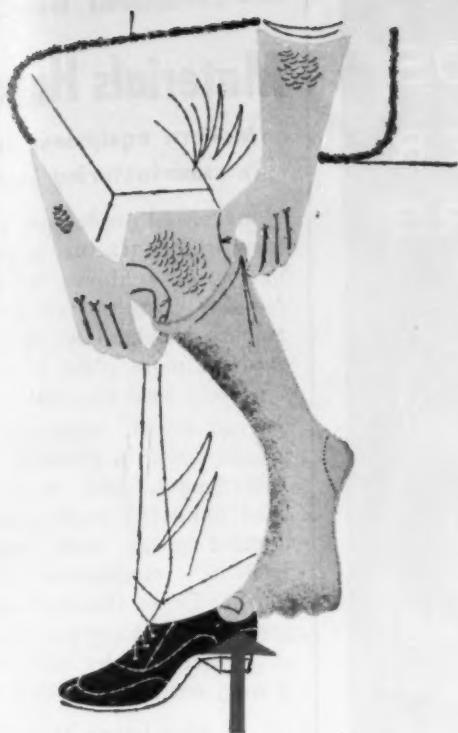
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a hole here is a nuisance...



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Crucible Hollow Tool Steel Bars are saving time and money for more and more members of the metalworking industry. By using these hollow bars you eliminate drilling and boring operations, increase machine capacity and cut scrap losses.

Now, you can get hollow bars of any of Crucible's famous tool steel grades, in almost any combination of O.D. and I.D. sizes. And you can get *immediate* delivery of five popular grades from your local Crucible warehouse—KETOS® oil-hardening, SANDERSON® water-hardening, AIRDI 150® high carbon—high chromium, AIRKOOL® air-hardening, and NU DIE V® hot-work tool steels.

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May 6, 1954

165

NOW! GRAND RAPIDS UNIVERSAL CUTTER AND TOOL GRINDERS



*are on
improved
delivery
schedules*

It's true, they have been hard to get because every model offers extra value.

The Model 62, for instance, features four-speed spindle drive, universal positioning of elevating hand wheel, anti-friction ways, more vertical capacity, longer swing, one-shot lubrication system.

The many other Grand Rapids Cutter Grinders are also on improved delivery schedules. Send coupon for complete information.

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Materials Handling:

Modern equipment cuts costs in manufacturing bottle caps.

Increased production and lower costs in manufacture of bottle caps has been achieved by replacing manual handling of goods with modern mechanized equipment at the Baltimore plant of the Crown Cork and Seal Co., Inc.

Four-wheel, manually pushed trucks used in Crown's receiving department, and manually-operated hand lift jacks used in production areas were replaced by modern, mechanized industrial trucks. These included eight operator-led battery-powered units manufactured by the Automatic Transportation Co., Chicago.

Man-hours Reduced

As a result, greater efficiency and reduced man-hours have been effected in several departments.

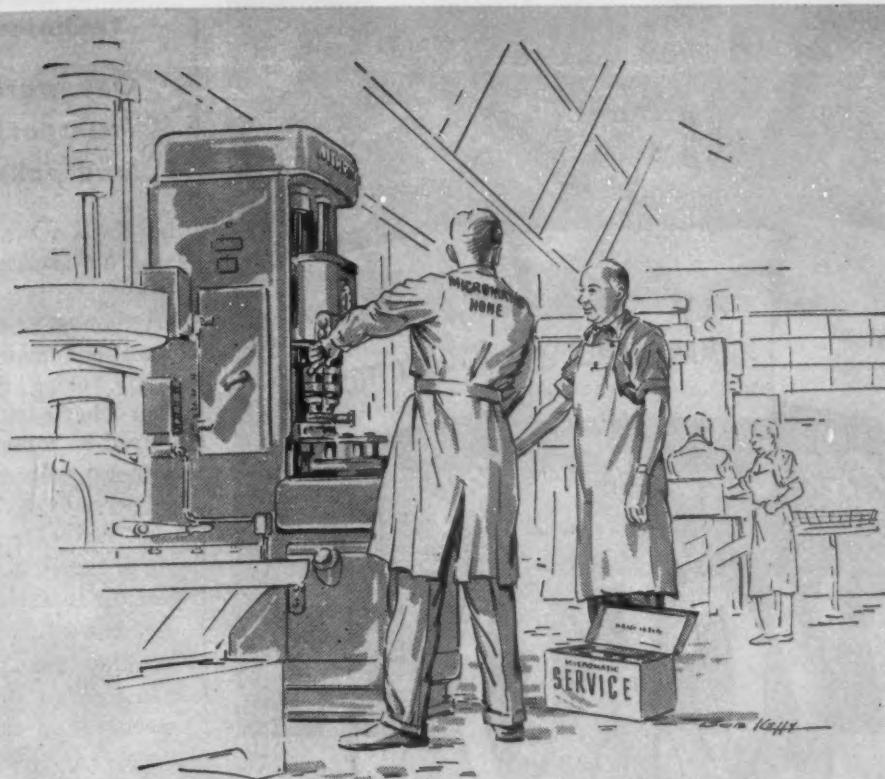
Incoming raw materials (glue, paper, cartons, wax, etc.), unloaded from trucks on to pallets by a four-man gang, are routed via a Transporter to the "Spot" department on the fourth floor, a travel distance of some 200 yards, not including vertical elevator movement. Loads handled range up to 2000 lb.

Here some of the incoming materials are processed into spot crowns—regular crown corks with the addition of a scientifically selected spot material to prevent the liquid in the bottle from com-



Sheet for bottle caps ...

Turn Page



the staff 'without portfolio'

Industrial processors who choose Microhoning are gaining more than a precision-production method of processing. A single source of responsibility for the complete honing operation . . . including machine, tool, fixture, abrasive, and accessory performance . . . is saving them servicing time and expense.

Microhoning's capacity to remove stock, produce a truly round and straight bore, automatically control size, and develop a consistent functional finish . . . is assured by Micromatic's staff of skilled engineers.

This nationwide group of technicians puts into action its cumulative experience to bring out the full potential of every installation. It is a staff which covers every honing phase in projecting Micromatic's acceptance of undivided responsibility.

In effect, it is the customer's staff 'without portfolio.'



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Technical Briefs

One worker can handle Transporter, three men load pallets . . .

ing into actual contact with the cork disk assembled in the crown.

A round trip from the receiving department to the spot crown area takes one man 25 minutes. Formerly, using manually-operated four-wheel trucks, two men required 35 minutes for only a one-way trip. In addition, with two men pushing the manual truck, only two were left at the unloading dock to continue palletizing incoming materials.

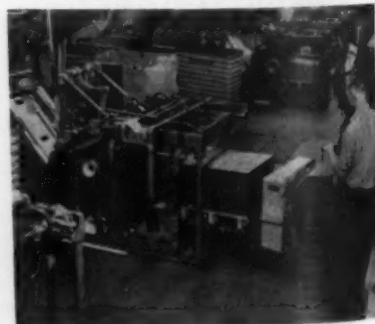
Now, while one worker alone handles the Transporter, three men continue to load pallets, thus speeding up the unloading operation.

Screw Cap Press Room

In the making of screw-caps, sheet metal is trailer-trucked from the lithography department (where designs are printed on it) to a holding platform on the first floor of the building housing Crown's screw cap department.

Here, one man with a platform Transporter takes over, moving 2000 lb loads of sheet, via elevator, to a storage area on the third floor, a distance of approximately 100 yards. Time of travel is five minutes, as compared to a former 20-minute trip requiring the manual efforts of two men.

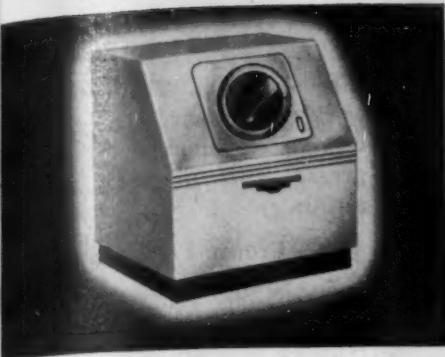
To insure a constant, timely flow of sheet metal, Crown uses three Automatic Transporters for



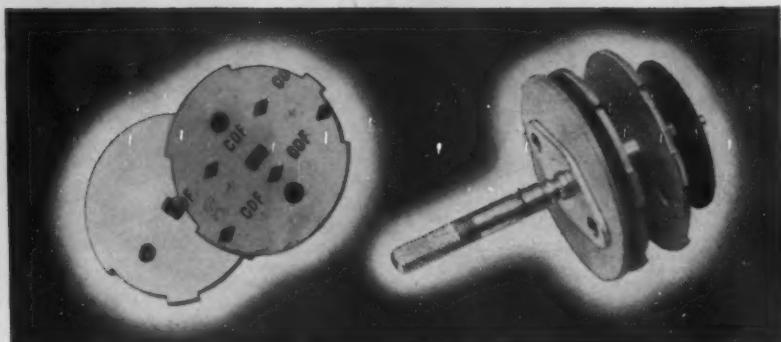
. . . eased into presses

Turn Page

THE IRON AGE

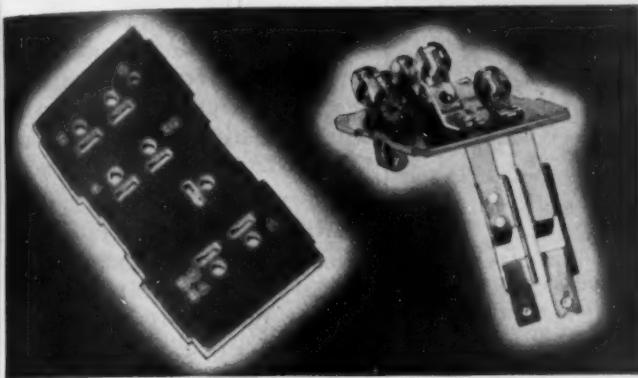


What makes the miracle of automatic washdays? What gadget turns water on and off; starts spinners, agitators, fans; regulates heat . . . all on a precise timing schedule? Chances are it's a P. R. Mallory timer switch.

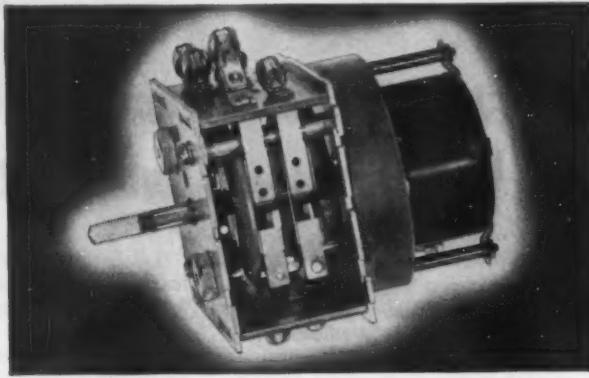


Special paper-base Dilecto laminated phenolic cams are the heart of the switch. If the corners are not sharp, if tolerances are not held, if the laminated plastic fails,

the timing schedule would go haywire. But it doesn't happen with Dilecto cams fabricated by C-D-F, now definitely identified for performance comparison.



C-D-F also supplies these Dilecto insulating side boards. Dilecto Grade X-13 was chosen for its ability to withstand severe riveting and staking impact, for its sturdiness in holding up under the strain of plugs being inserted and removed from terminals mounted on the board.



Look inside the smart, small, tough Mallory timer switch. The shaft revolves; with the switch operated by a manual clock which is wound or set whenever the switch is turned over to complete the entire cycle. *Switch accuracy depends entirely on the degree of accuracy in which the cam is manufactured.*

C-D-F and DILECTO® LAMINATED PLASTIC helped Mallory improve design . . . simplify purchasing . . . speed production

Two C-D-F Dilecto laminated plastic parts play small but vital roles inside P. R. Mallory's timer switches used to control the washing, drying, rinsing cycles.

Most important, the timing cams must be precisely fabricated to odd, notched shapes, with very close dimensional tolerances. In the design stage, it was first thought that there was no practical way to obtain the desired pieces.

But engineering-supplier teamwork always pays off. Good basic design . . . a quality material from an alert, interested fabricator . . . selective purchasing resulted in a solution.

C-D-F WORKS WITH DESIGNERS

A father and son team, in Mallory's Switch Division, Arthur and Harry Hall, began 15 years ago to make this timer switch. Cam material after material was tested . . . none worked satisfactorily.

C-D-F sales engineer Robert Tappan was called in. He says, "After 18 months, the design was adaptable to Dilecto laminated plastic. The first cam did not work, but showed promise. Looking back, it was a crude punching compared to the ones now furnished by the C-D-F Valparaiso plant."

A BIG, RELIABLE SOURCE

Mallory makes thousands of timer switches, naturally has several suppliers for laminated plastic insulation. But C-D-F keeps working hard to further improve the product: Special tools have been designed to increase

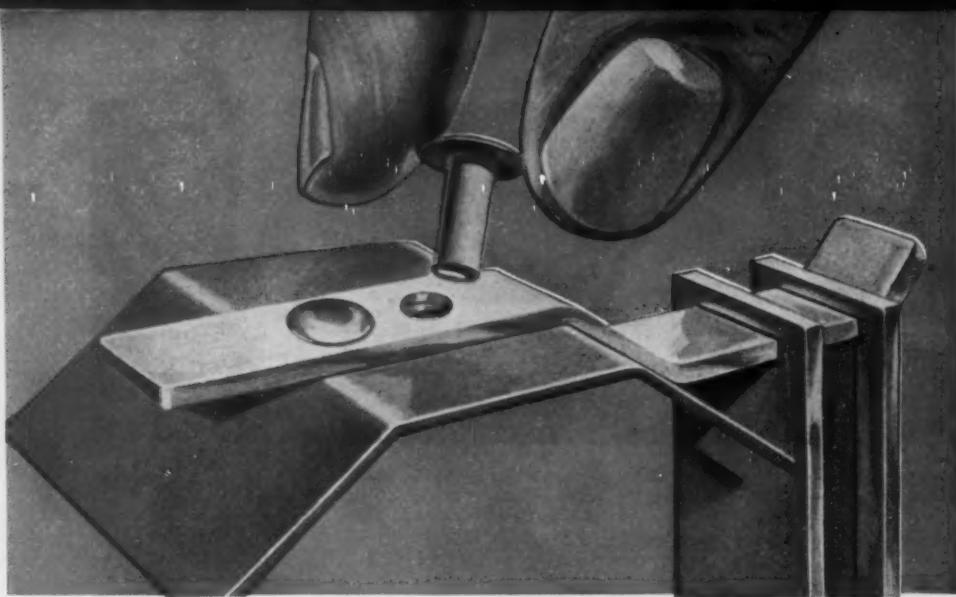
the accuracy of C-D-F cams, to provide Mallory with lower rejection rates. Resin-penetrating and laminating techniques have improved Dilecto grades. Inspection and quality control have been modernized.

When you have a problem in laminated plastics, think of improved, Dilecto and C-D-F. Send us your print for technical advice and quotation. Write for free test samples. The C-D-F catalog is in Sweet's Design File and the IRE Directory. Best of all, call your C-D-F sales engineer . . . He's a good man to know!



Continental-Diamond Fibre

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK 85, DELAWARE



You Enjoy The Economy Of Quality With Townsend Tubular Rivets

If you use tubular rivets in your assembly operations you know that uniform physical properties and accurate dimensions are essential to efficient operation. We, at Townsend, know it too. That is why wire of the proper grade and analysis is drawn to specifications in our own wire mill to assure positive control of the quality you enjoy when using Townsend tubular rivets.

Since tubular rivets are set with comparatively little pressure, they are often used in materials which cannot stand the impact required to set solid rivets. In these cases the uniform ductility of Townsend tubular rivets is doubly important.

Townsend tubular rivets feed readily into any make of automatic machine—may also be set easily by hand. Their appearance is good—adds to the attractiveness of your product. They weigh less than many other types of fasteners—reduce product weight.

The majority of Townsend semi-tubular rivets are made with an extruded hole which is tapered. When set, there is more material in the clinched end which produces great holding power and develops a shear strength comparable to other fasteners.

Townsend tubular rivets are used extensively in the electrical industry for assembling radio and television sets—in the automotive industry to assure safe, positive fastening of lining to brake shoes—in the furniture industry and many others where quick, secure, economical assembly is desired. These rivets are available in a wide range of sizes in steel, brass, aluminum and copper.

In addition to being the world's largest manufacturer of a complete line of rivets, Townsend has become known as "The Fastening Authority"—has developed special skills and accumulated experience in assembling products of metal, wood, plastics, fabrics and glass. This knowledge enables Townsend engineers to help select or design the fastener best suited to your product and assembly methods. They have over 10,000 special and standard items to draw upon. Also, Townsend's tremendous capacity of 60-million pieces daily is your assurance that delivery will keep pace with your production. You can depend upon Townsend as a reliable source of quality fasteners at a reasonable cost. To enjoy the economy of quality—specify Townsend fasteners.

Townsend

COMPANY • ESTABLISHED 1816

NEW BRIGHTON, PENNSYLVANIA

Sales Offices in Principal Cities

Cherry River Division • Santa Ana, California

THE FASTENING AUTHORITY—Experience: over 138 years—Capacity: sixty-million parts daily—Products: over ten-thousand types of solid rivets—cold-headed parts—Cherry Blind Rivets—Twifast Screws—self-tapping screws—tubular rivets—locknuts—special nails—formed wire parts.

Plants: New Brighton, Pa.—Chicago, Ill.—Plymouth, Mich.—Santa Ana, Calif.

In Canada: Parmenter & Bulloch Manufacturing Company, Ltd., Gananoque, Ontario

—Technical Briefs—

this operation. The trucks also work on the third floor, servicing waxing machines and screw cap presses with necessary raw materials.

Crown Press Room

As in the screw cap department, mechanized handling has reduced over-all production time in the firm's crown press room, serviced by Transporters handling metal skid loads of lithographed tin plate.

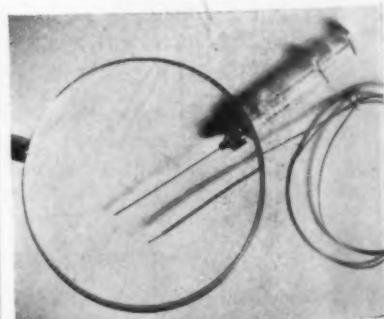
Maneuvering in aisles only 3 to 4 ft wide, the units move 2400 lb skid loads from adjacent storage area to the punch presses, unloading directly into automatic feeders.

Crown points out two important additional advantages gained here by using powered handling equipment: one operator tends a battery of punch presses, assuring that each press has a sufficient supply of tin plate. The time saved by using Transporters permits this operator to keep a closer watch on each press.

Instruments:

Thermocouple measures temperatures in nuclear reactor.

A new type thermocouple developed at Argonne National Laboratory makes possible temperature measurements inside the fuel elements of operating nuclear reactors. The new thermocouple is only slightly thicker than a standard hypodermic needle. Because



THIN NEW THERMOCOUPLE is slightly heavier than the hypodermic needle with which it is compared.

—Technical Briefs—

Construction of couple changed to reduce size . . .

of its thinness, flexibility, and ruggedness it can be threaded through small and winding passageways into places which cannot be reached by conventional thermocouples.

How It's Built

Construction of the thermocouple consists mainly of inserting a thin insulated constantan (copper-nickel-manganese alloy) wire into a small diameter inconel tube of the hypodermic needle type and drawing the tube through a die on a draw-bench, thereby tightly gripping and sealing the wire within the tube.

The inconel tube (a special type of stainless steel) and the constantan wire, being dissimilar materials, comprise the couple components. The fabrication of the thermocouple is completed by fusing the wire and tubing at one end.

Wire and Tube Construction

By using the wire and tube type of construction, the Argonne scientist was able to greatly reduce the diameter of the couple, and by utilizing an inconel tube, which does not corrode easily, the need for an over-all protective tube was eliminated.

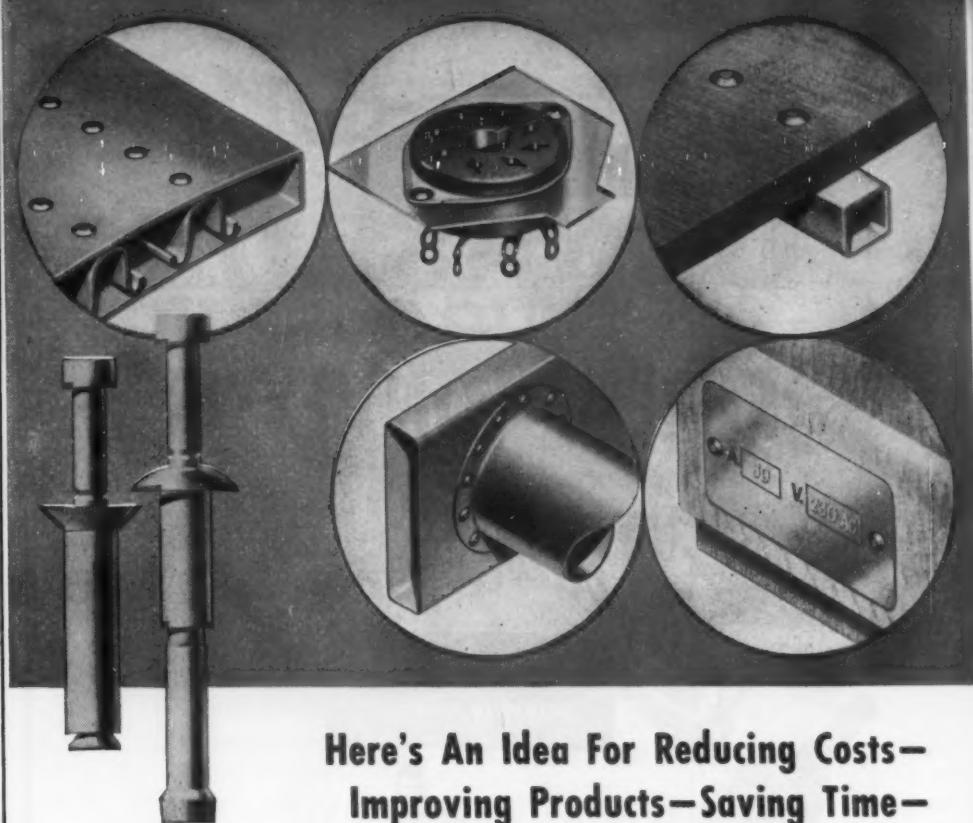
Thermocouples which are 0.040 in. in diam and 20 ft in length have been constructed and used by Argonne scientists to detect and record temperatures up to 1250°F.

Engineering:

Production of prototypes simplified with plastics.

Production costs have been cut as much as 90 pct for prototype models of General Electric Co. appliance parts by using Bakelite vinyl resins in a new flexible mold process. Production time is also slashed by more than 60 pct in casting electric iron handles, fan motor casings, and electric clock cases with plastics.

Turn Page



Here's An Idea For Reducing Costs— Improving Products—Saving Time— Use Cherry Blind Rivets

To reduce unit costs, save assembly time and improve product design may sound like a big order for a fastener but that's exactly what Cherry Blind Rivets are doing today for many manufacturers. This is the rivet that is installed by one man from one side of the work—economically and quickly. There is no bucking—no hammering—no twisting—no exploding. Cherry Rivets are used in double-surfaced structures, box sections, tubes, ducts, and other hard-to-reach places.

Several factors reduce unit costs. To begin with, one man is eliminated from the rivet crew. Also, material spoilage is reduced because Cherry Rivets are installed by a pulling action—the gun won't mar surfaces or shatter brittle materials with violent blows. Often jigs and assembly procedures are simplified when set up for Cherry riveting.

ing. Because the process is fast, units move quickly along assembly lines—bottlenecks are eliminated.

Designers specify Cherry Rivets because they are not hampered by blind spots—can employ modern contours and a wide variety of materials. This latitude enables them to improve product appearance and salability. Other advantages—they pull up tight, resist vibration, eliminate nuts, bolts, and washers—provide a tamper-proof fastening because they are permanent. Cherry Rivets are widely used in maintenance work too, since they often eliminate need to tear down entire areas of equipment to repair small sections.

For information on how you can use Cherry Rivets in your operations to reduce costs, improve products, and save time, fill in the coupon below or write for 12-page bulletin.

Townsend

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New Brighton, Pa.

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Technical Briefs

The efficient and economical flexible mold process, developed by General Electric's Small Appliance Div., produces prototypes of uniform quality at nominal cost. Casting intricate detail or thin wall sections of production parts is simplified by the flexibility of the mold. These molds are made of plastics, produced by Elastomer Chemical Corp., Newark, N.J., and are based on Bakelite vinyl resins.

Costs Are Cut

The latest design for an electric iron handle, for example, seldom goes from the designer's drawing board to the production line. Instead, a small number of prototypes or models are cast for use in consumer and marketing surveys.

The production part is chosen from one of these prototypes. The new molds produce models at about one-tenth the cost of temporary metal molds; they resist breakage better and cast more models than plaster molds; and they eliminate the cost of finishing sand-cast metal parts.

Casting a dozen sample parts from a temporary metal mold previously cost about \$3,000. Now the same parts are cast from a flexible mold at a cost of \$300.

Takes 4 Hours

The simplest plaster mold takes 4 hr to make as compared to 1½ hr for the same flexible mold.



Making the prototype ...

Technical Briefs

Resins impart flexibility to molds . . .

More intricate molds take 16 hr to make from plaster because they require four to five different mold pieces. The same mold, completed in 5 hr, can be made in one piece because of the flexibility imparted to the plastisol by Bakelite vinyl resins.

This flexibility combined with abrasion resistance also yields more castings per mold. Not more than four prototypes can be cast from a plaster mold before renewing. A duplicate set of flexible molds can make 25 to 40 castings without renewing.

From Flexible Mold

Prototypes cast from phenolic or epoxy resins damage plaster when hardened and removed from the mold. Each part cast after the first will require up to 3 hr finishing time due to this mold damage. Castings from a flexible mold, however, are uniform throughout the entire run.

A wooden or plaster pattern made in the shape of the desired part leaves an exact mold cavity in liquid plastisol that is baked hard around it. Bakelite C-8 epoxy or phenolic resins can then be poured into the cavity and hardened at low temperatures. Due to the low shrinkage and high impact strength of Bakelite C-8 resins, the hardened castings stripped from the mold are durable and almost exact reproductions of the original pattern.

Cutting Tools:

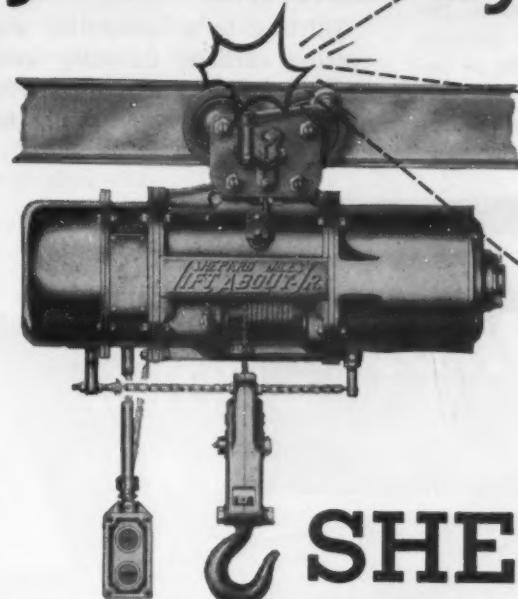
New carbide cutting tools reduce production costs.

A shift of carbide cutting tools in machining Timken alloy rims of jet engine turbine wheels at the Lynn River Works of General Electric Co. recently paid off three ways.

Besides reducing down time by two-thirds — which meant increased production — it increased

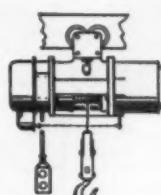
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TOUGHEST HOIST you can buy!

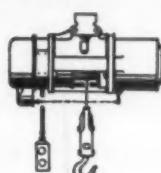


SHEPARD NILES

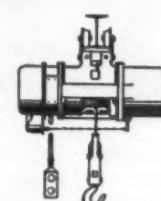
LIFT ABOUT-JR.



500 T Parallel or Cross Mounted.



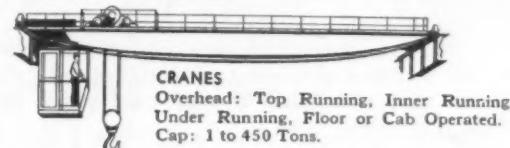
1000 J Parallel or Cross Mounted.



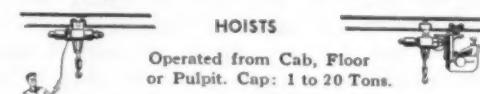
2000 M Parallel or Cross Mounted.

Hook your load to a Lift About-Jr.—it's the toughest light-service hoist you can buy. This rugged Shepard Niles Hoist is ideal for a hundred-and-one lifting jobs, guarantees you years of dependable service. It offers trouble-free wire rope hoisting, either rope or push-button operation.

Let a Shepard Niles representative tell you about the complete Lift About-Jr. line. He'll help you select the hoist with the right capacity and controls for your job.



CRANES
Overhead: Top Running, Inner Running,
Under Running, Floor or Cab Operated.
Cap: 1 to 450 Tons.



HOISTS
Operated from Cab, Floor
or Pulpit. Cap: 1 to 20 Tons.

SHEPARD NILES Crane and Hoist Corporation

1446 Schuyler Ave., Montour Falls, N.Y.

- () Please send me your new *Lift About-Jr. Bulletin*.
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MAIL
COUPON!

—Technical Briefs—

tool life 300 pct and reduced tool breakage drastically.

Turning, Boring, Facing

Previously the operation, consisting of a turning and boring operation of both inside and outside diameters, then facing, required the use of a new carbide tool every time an outside or inside diameter was completed.

This involved frequent tool

changes and new setups. Furthermore, some 30 to 40 tools hit the scrap heap due to breakage. Even in boring, the attrition rate of the previously used carbide tool was high, since it lasted through only one cut.

Shifting to a heavy-duty steel cutting carbide, Carboly grade 370, the picture changed considerably. Now, the new cutting tool

outperforms the previous carbide better than 3 to 1.

The work is cold worked, forged Timken steel with Brinell hardness readings ranging between 269 to 321. Yet in spite of this hardness and toughness, and the varying grain structure of the steel, which makes it difficult to cut, the carbide cutting tip now used produces three inside and outside diameter cuts before being ready for regrinding.

In this setup, the work rotates while the tools for cutting both the outside and inside diameters simultaneously remain fixed. The cutting tools used are provided with a 15° lead angle, $\frac{1}{8}$ -in. radius and a chip breaker.

Flooded With Coolant

The work revolves at a speed of 20.2 rpm with the tools set at 0.010-in. feed, the depth of cut varying from $\frac{1}{2}$ - to $\frac{3}{8}$ -in. Tool travel at the cutting surface is about 160 sfpm on the outside diameter, and 110 sfpm on the inside diameter. Both cutting areas are flooded with a water soluble coolant.

Since all tools here are used to make heavy interrupted cuts up to $\frac{3}{8}$ -in. in depth, they are supplied with a sandwich braze except when boring. The tool for the latter is brazed in the conventional manner. In all operations, turning, boring and facing, a 36-in. Bullard, powered with a 50-hp motor is involved.

BOOSES EARNINGS TOO!

The Differential Air Dump Car has a way with operating expenses — cuts 'em down!

There's another pair of massive muscles on the other side of the car, too, means two-way dumping and greater flexibility.

They're built to take rough treatment — whether it's the slam-banging of the clam or the sudden dumping of tons of hot slag. These cars can take it and can come back faster for more.

Higher ratio of payload to dead weight! Fewer trips to the shop and shorter stays when they do go! Add all these up and it spells lower operating costs — another way to say "Boosted Earnings". Write for the full story on these cars.

Other Differential Products: Locomotives, Mine Cars, Mine Supply Cars, Rock Larries, Mantrip Cars, Dumping Devices and Complete Haulage Systems.

DUMPS BOTH WAYS



DIFFERENTIAL STEEL CAR COMPANY
FINDLAY, OHIO
SINCE 1915 — PIONEERS IN HAULAGE EQUIPMENT



MACHINING TURBINE wheel rim of the Lynn River Works of General Electric Co.

Deep Drawing:

Tool engineers extend usefulness of heavy press.

Imagination and ingenuity have been used by Pastushin Aviation Corp., Los Angeles, to extend the usefulness of its heavy equipment.

A typical example is a Verson hydraulic forging press built by the Verson Allsteel Press Mfg. Co. The press was used to forge artillery shells until the end of World War II, when it was placed in storage. With a capacity of 250 tons without cushions, 30 x 36-in. bed, 66-in. stroke and shut height of 92 in., the press was designed to deep-draw shell billet stock, and was not designed to form sheet metal.

To Make Fuel Tanks

Pastushin tooling engineers decided to rebuild the press to permit deep-drawing of sheet metal parts up to 14 ft in length. First use of the rebuilt press was to deep-draw jettisonable fuel tank nose halves, 25 in. OD and 80 in. long. Skin material is 0.072-in. gage 61 SO aluminum.

Major problems confronting Pastushin engineers were these: bed size had to be increased; suitable draw-die designed; limited side housing clearance utilized; ram movement changed from high-speed, long-stroke to medium-

speed, short-stroke; missing parts replaced; the press generally cleaned and restored to working condition.

Bed Size Increased

The bed size was increased from 36 by 30 in. to 36 in. by 14 ft by adding special overhanging bolsters 14 ft long with 5½-ft overhang. Weighing 12,000 lb the bolsters were fabricated and machined from steel plate.

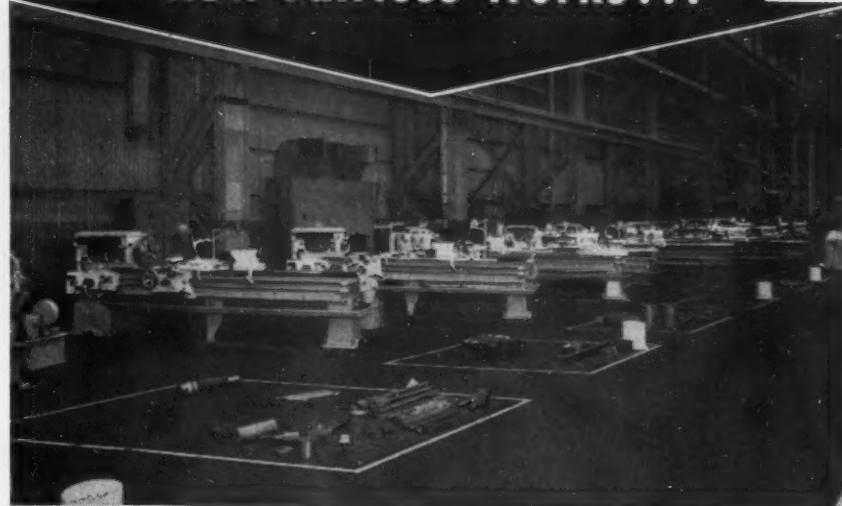
To reduce the 92-in. shut height, the bolsters were fabricated 36 in. deep, reducing the shut height of the revised press to 20 in. and the stroke to 66 in., ample for sheet-metal draw-die operations. The bolster depth makes possible great rigidity with only minor deflections.

Draw Die Design

Designing the draw-die was the next problem. Since the distance

Turn Page

13 LEHMANN Engine Lathes NOW at work in U. S. Steel's New Fairless Works...



The largest integrated steel mill to be built at one time uses LEHMANN Lathes in its modern maintenance shops!

The Fairless Works, built on 3,900 acres and one of the biggest expansion projects built in our time, incorporates the most modern steel mill equipment available. One of the big jobs at Fairless is that of maintenance. Special shops to keep all the equipment used in this 2.2 million ton plant in top running order are an important part of Fairless.

The machine tools, cranes and other equipment necessary for cleaning, machining and repairing the mill operating equipment (which, in fact, make practically all repairs required at Fairless) include 13 Lehmann engine lathes! Some of these lathes are shown in the above photo.

Find out how Lehmann Lathes can bring efficiency, safety and speed to the operations in your plant. Write today for information or catalog — or — send prints for time and money saving recommendation.

LEHMANN
MACHINE COMPANY
GRAND ST. CHOUTEAU • ST. LOUIS 3, MO.

DIVISION OF NOVO ENGINE CO.

Blank for fuel tank . . .

May 6, 1954

Technical Briefs

between the press side housing was 8 in. less than the necessary width of the blank, the die was designed in an unusual manner to allow the skin to extend beyond the clamping surfaces of the pressure plate and draw ring. If unsupported the skin would ordinarily wrinkle even before contact with the die due to the irregular rates of metal flow at different points along the die.

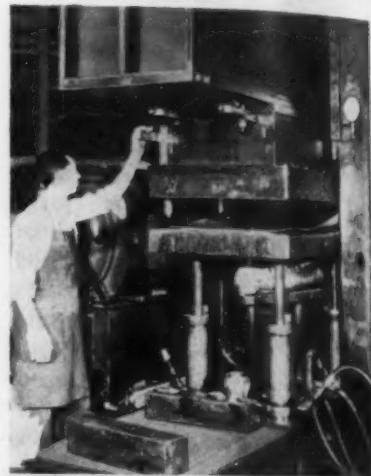
To permit insertion of the blank

into the press 8 in. narrower than the blank width, the blank was flanged to allow vertical flow in the clearance between the die and the side housing before entering the draw plate.

Cushions Controlled In Pairs

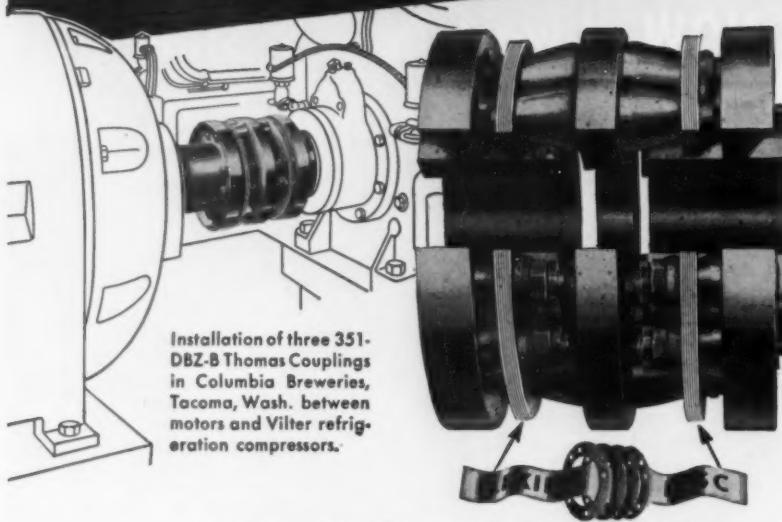
Eight self-contained portable cushions, each capable of exerting 12 tons of force, are adaptable to any die and can be easily removed

Self-contained portable cushions are adaptable to any die . . .



Ram comes down . . .

THOMAS FLEXIBLE COUPLINGS... for more years of better service!



Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

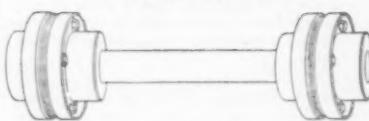
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



THOMAS COUPLINGS ARE MADE FOR A WIDE RANGE OF SPEEDS, HORSEPOWER AND SHAFT SIZES.



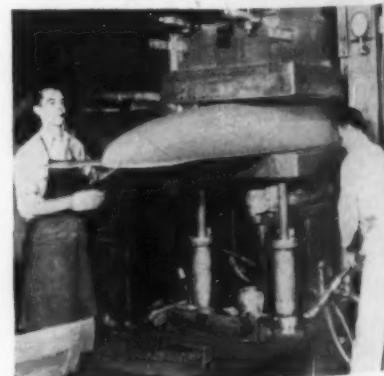
Write for our new Engineering Catalog No. 51A



THOMAS FLEXIBLE COUPLING COMPANY

Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

Formed tank removed . . .



Machining:

New process simplifies machining of high density tungsten.

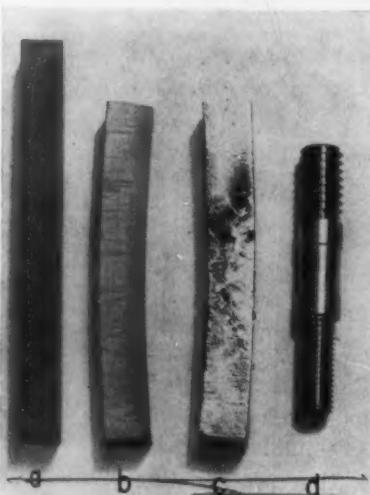
A new process for machining high density tungsten to tolerances comparable to those possible with steel or brass by using ordinary cutting tools and shop equipment was described recently by Dr. Roberto Levi of Philips Laboratories, Inc., Irvington-on-Hudson, N. Y.

The process is used in making dispenser cathodes for electron tubes. It permits machining the tungsten cathodes to specifications that require accurately controlled dimensions, porosity and gas permeability.

Three Steps Required

Success of the new process depends upon three steps in handling sintered tungsten ingots: (1) impregnation with a suitable wetting metal, with which it does not alloy, such as gold or copper; (2) machining; (3) removing the impregnating metal.

Desired physical characteristics of the sintered tungsten ingot are



FOUR STAGES in new process for making high density tungsten machined parts show (left to right) pre-sintered ingot, same ingot after high temperature sinter, sintered ingot copper impregnated, and machined part.

obtained by high temperature sintering with a proper consideration for tungsten powder characteristics, pressure used in forming the ingots and the dew point of the sintering atmosphere.

The impregnating metal acts as a filler and lubricant and prevents tearing out of particles, burnishing and excessive tool wear which ordinarily occurs.

Sintering the tungsten ingot normally produces distortion and warping, but this is no longer a problem as this operation precedes machining.

The process temperatures used

to add and remove the wetting metal and the application temperatures are well below sintering temperature and therefore have no effect on the final shape, tolerances, or physical characteristics.

Fabricate High Density Parts

Tungsten parts having density values up to almost 90 pct of theoretical value may now be fabricated. Machining is relatively easy in the case of densities up to 83 pct.

Higher density parts become more difficult to machine because

Turn Page



Flame-proof PEEL FILMITE snuffs out flame.. ordinary plastic booth coating supports it

PHOTOGRAPHIC PROOF THAT PEEL FILMITE IS SAFE FOR PAINT SPRAY BOOTH MAINTENANCE. Here's a true and dramatic flame test—visual demonstration in safety for paint spray booth operation. While ordinary plastic coat sealer bursts into dangerous flame, DuBois' new Flame-Proof PEEL FILMITE simply snuffs out the lighted match. Here's an important safety factor, a complement to PEEL FILMITE's smooth, opaque white coating . . . its ease of spraying on—ease of peeling off . . . plus the man hours saved in booth clean-up. Write for descriptive folder. Learn how to save "good hard dollars" on spray booth maintenance.

SPRAY ON. PEEL FILMITE sprays on evenly, forms a smooth, white opaque coating that dries quickly. Non-greasy surface reflects light, resists gasoline, alcohol, fats, acids, alkalis.

PEEL OFF. Peels off in sheets like the skin of a tangerine. Spray booths are actually cleaned in minutes, not hours. PEEL FILMITE eliminates messy hand scraping.



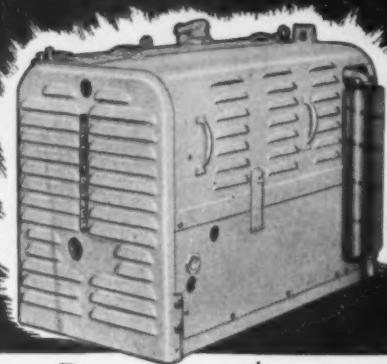
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Located Coast-to-Coast

The DuBOIS Co., Inc.

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—Technical Briefs—

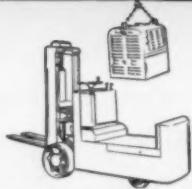
The Most Flexible "Power Package" available for Industrial Trucks!



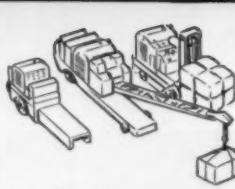
READY-POWER Gas-Electric Drive



Ready-Power units can be installed in minutes



You can remove Ready-Power units in minutes



Use Ready-Power on any type of electric truck



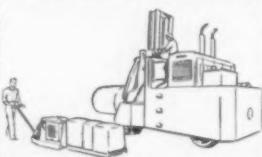
Ready-Power units can be interchanged with batteries



"Tune up" a spare Ready-Power while trucks work



Ready-Power-equipped trucks know no time limitations



There are Ready-Power models for all truck sizes



Ready-Power is the originator of gas-electric drive for electric industrial trucks!



The READY-POWER Co., 3822 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

the percentage of non-connecting pores, which cannot be infiltrated, goes up rapidly with increasing density.

In the past, tungsten sintered to the required high density of 80-85 pct of the theoretical value could not be machined. Hardness and brittleness at ordinary temperatures and other difficulties made the machining operation impossible.

Preformed By Pressing

Parts were either preformed by pressing tungsten powder in a die or were machined from partly sintered, very porous ingots having a density of about 55 pct of the theoretical value.

As the tungsten particles are very weakly bonded together in such partly sintered ingots, the particles were torn out in clusters in the machining instead of being cut by the cutting tool.

Other Machining Operations

Smooth surfaces could not be obtained by this old method. Also shrinking and warping during the required final sintering operation made it difficult to maintain required shapes and dimensions.

The new process will permit the drilling, grinding, turning, milling, threading and tapping of tungsten parts with ordinary machine tools.

Plating Waste:

Acid-resisting pipe installed to handle acid disposal.

The new plating plant of Cadillac Div. of General Motors Corp., Detroit, had to be designed to handle great amounts of corrosive fluids and acids used in the plating process. One of the major problems to be solved during construction was the conduction and disposal of such fluids in the most efficient and economical way.

Fluids used in the plating process, such as chrome platers' solutions, chrome color dyes, and

Turn Page

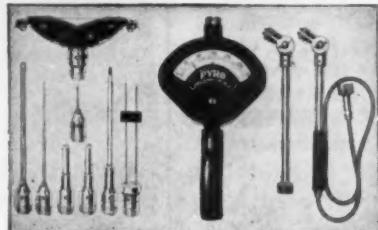


PYRO SIMPLIFIED OPTICAL PYROMETER

Any operator can quickly determine temperatures on minute spots, fast-moving objects and smallest streams. Completely self-contained. No calibration charts or accessories needed. An accurate, direct reading Pyrometer that pays for itself by helping prevent spoilage. Weighs 3 lbs. Available in 5 temperature ranges (1400°F. to 7500°F.). Ask for free Catalog #85.

Designed to meet all plant and laboratory surface and sub-surface temperature measurements, with selection of thermocouples and extension arms. The Improved Pyro is quick acting, accurate, light-weight and rugged. It features large $4\frac{1}{2}$ " direct reading scale, automatic cold and junction compensator and shielded steel housing—all combined to offer highest precision, accuracy and dependability. Available in five standard ranges from 0-300°F. to 0-1200°F. Ask for free Catalog #168.

PYRO SURFACE PYROMETER



THE PYROMETER INSTRUMENT COMPANY

BERGENFIELD 37, NEW JERSEY

NEW PLANT AND LABORATORY

Manufacturers of Pyro Optical, Radiation, Immersion and Surface Pyrometers for over 25 years

TEST HARDNESS OF ANY SIZE,
SHAPE, TYPE METAL...

anywhere...
in one
easy motion!

This 30 oz., 3 in. high tester, in 30 seconds, gives direct dial readings on the job. Just press handgrips, read dial.



Accuracy guaranteed by individual calibration. Available in:

Rockwell "A" 35-75 Scale
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Now! Bench stand for mass production testing.

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Brinell Low 50-260 Scale

Write today for Booklet ET 503 or demonstration in your shop.

NEWAGE INTERNATIONAL portable metal hardness testers

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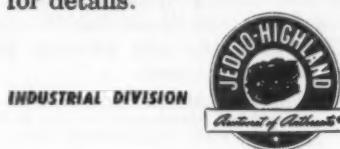
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Our new, modern plant for the preparation of industrial anthracite now enables us to offer an ample and continuing supply of that finest of fuels, Jeddo-Highland premium anthrafines. Here is an opportunity for many buyers to reduce fuel costs. We suggest that you write for details.



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REVCO SUB-ZERO CHESTS

Temperatures
as low as

-95°

BELow ZERO

For
Shrink Fits

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Seasoning Gauges
and
Precision Tools

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For Tests



Completely equipped ready for operation. The 1.5 Cu. Ft. model as shown handles parts or assembled units up to 23" long, 12½" deep x 9" high and the 6.5 Cu. Ft. model up to 47" lengths, 16" deep x 15" high. Revco Sub-Zero Chests meet highest performance standards featuring temperatures of 95° and 85° below zero while running continuously in normal room temperatures. Other controlled low-temperatures readily attained.

REVCO RIVET COOLER for aircraft application is equipped with 90 rivet canisters in six convenient removable racks. Operates efficiently at temperatures as low as minus 35° F.

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LIFT-O-KRANE

**is rough,
tough and
ever-willin'**

With this versatile
LIFT-O-KRANE you can
do the impossible . . .
Use it as a Crane
Truck, a Fork Lift
Truck and/or as a
Ram Truck.*

Silent Hoist heavy duty LIFT-O-KRANE is designed to make the most difficult job "all in the day's work." Take, for example, one of the 5 ton capacity LIFT-O-KRANES in daily duty at SUN OIL COMPANY, Marcus Hook (Pa.) Refinery. Here it is shown easily handling a bulky, unbalanced, heavy-to-handle accumulator tank. Its next job may be dragging lengths of pipe lines and locating them properly in ditches . . . then lifting and moving giant valves and heat exchangers and installing them in their proper place in the refinery lines. According to one Sun Oil executive, LIFT-O-KRANES lift and serve, day after day, with efficiency and dispatch, and replace entirely any need for regular cranes.

*3-IN-1 MACHINE: { With integrated BOOM Attachment—handle Hook Loads.
{ With RAM Attachment—handle Hollow-Center Loads.
{ With its FORK Tines—handle Timber, Machinery, etc.

You, too, should investigate the tough, maintenance-free service of
LIFT-O-KRANE Combination Machine . . . and LIFTTRUK Heavy-Duty Fork
Truck . . . in 5 - 7½ - 10 - 15 ton capacities. Send for Bulletin 77.

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Pioneers of Heavy Duty Materials Handling Equipment
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Technical Briefs

**Special pipe overcomes
corrosion problems . . .**

sulphuric acid in high concentrations, are highly corrosive, frequently result in corroded drainage lines, connections, fittings, often causing damage to equipment and machinery.

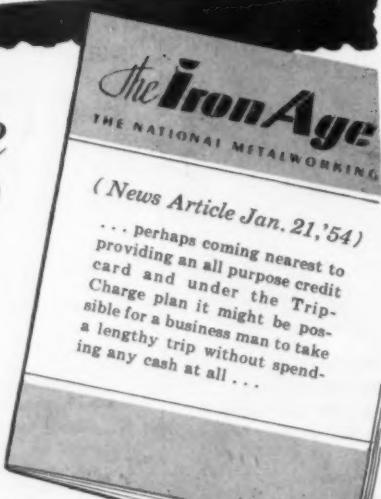
Maintenance Problem

The resistance of various piping and drainage systems to sulphuric acid corrosion is limited. Such systems wear out quickly due to the high corrosion rate, especially at elevated fluid temperatures. The replacement of corroded or damaged piping is expensive and time consuming, often necessitating complete shut-down of the plant.

Installation Simplified

This material problem was solved when "Screw-Seal" Industrial Clay Pipe, manufactured by The Robinson Clay Product Co., Akron, Ohio, was recommended as a permanent acid-resisting installation. This clay pipe and its connections are said to resist most chemicals and gases including sulphuric acid. Installation is simple and easy. The clay sections screw together with collars. When connections such as elbows, T's, and Y's are required in tight places a union joint with a split flange collar is used for quick and easy installation.

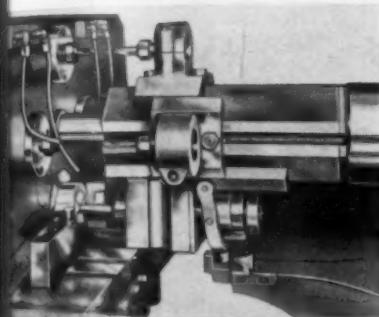
This type pipe can also be strap-hung from ceilings or buried in trenches where joints stay tight and leak-proof despite deflection from frost heave or backfill.



Installing the pipe . . .

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 145 or 146

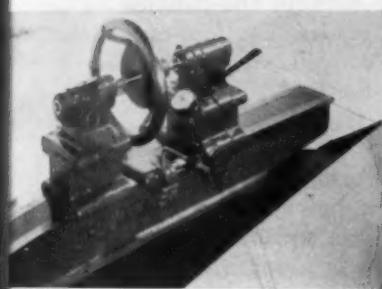


Machines front and back of pieces in one cycle

In one complete cycle the front and back of workpieces can be machined on a Double-Matic screw machine that also performs additional work after cutoff. It utilizes a tool holding turret revolving on an axis parallel to the spindle. Stock is fed through, clamped and machined on the front side. The final turret

position is occupied by a live spindle with collet that grips the workpiece, supports it during cutoff and continues to hold it. While turret tools machine the next piece, the back end is machined by tools mounted on the headstock. *Porter-McCleod Machine Tool Co., Inc.*

For more data circle No. 36 on postcard, p. 145

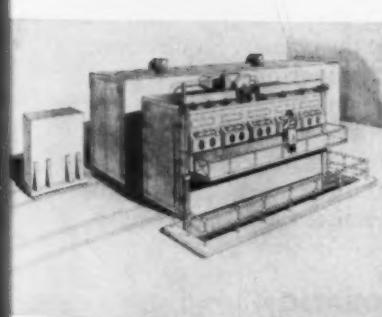


Centers hold cylindrical work for inspection

The bed of the improved B&S bench centers has been streamlined and modernized. It is of U cross-section, heavily ribbed with a three-point bearing. Headstock and footstock are adjustable individually and can be locked securely at any position on the bed. For support-

ing heavy work the spring-actuated center may be locked in position. Bench centers are furnished with or without dial test indicators. Headstock and footstock centers swing 8 in. diam; take work 36 in. long. *Brown & Sharpe Mfg. Co.*

For more data circle No. 37 on postcard, p. 145



Liquid honing equipment is 5-station machine

This large vapor blast liquid honing machine will be used by Wyman-Gordon Co. to clean and finish huge forging dies measuring up to 10 x 20 ft and weighing 100 lb. The equipment will occupy 20 x 60 ft floor space; is 14 ft high, plus a 10 ft deep base pit. The dies go through high pressure fluid baths

before and after each vapor blasting. Die finishers work from elevator platform which will move up and down along the face of the dies that stand vertically on a specially designed car. The car moves in and out of stations on rails. *Vapor Blast Mfg. Co.*

For more data circle No. 38 on postcard, p. 145



All aluminum conveyor brings job to the worker

The SM all aluminum conveyor was designed for hard use. It is braced crosswise, lengthwise and built entirely of extruded aluminum. It's easy for a man to rig-up a chain of these conveyors and move material in seconds through small openings, up or down steps or passageways that would otherwise be inaccessible. Powered by electric, gas or an

air motor, the wheel assembly can be removed for tight clearance. These conveyors will haul wet concrete, stone, brick, sand, flue dust, cinder, refuse, etc. They are useful in clearing out checker chambers, scale pits in rolling mills and under runout tables. *Farnco Sales Co.*

For more data circle No. 39 on postcard, p. 145

Turn Page

Why Alloy Steels?



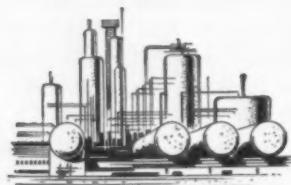
Carbon steels are better today than ever before. A major producer of both carbon and alloy steels, Republic is aware of this fact. Even so, there are limits to the application of carbon steels. Machine design may restrict the size of a part. High strength may be an essential combination with light weight. Sometimes surface hardness and ductility must be held within the limits. Such are the applications in which *only* alloy steels can perform definite tasks with certainty of results at lower ultimate cost.



Take large sections — where hardness must be carried deep into the steel. Heavy crankshafts, connecting rods, piston rods, large gear and axles are examples. Here alloy steels *are necessary*, and the cost low in proportion to results. With carbon held constant, depth-hardening quality increases as the alloy content is increased.



Sometimes weight and space limitations demand that smaller sections carry heavier loads safely. For safety's sake, the answer *must be* alloy steels. Under repeated stress, high tensile strength and hardness do not necessarily indicate high fatigue properties. The load-carrying ability of a steel depends upon its alloy constituents and the form of the structure at the time it is bearing the load.



A problem of high pressures at elevated temperatures may present a problem. But alloy steels *have proved* their high resistance to creep. Some stainless alloys maintain high strength up to 1800° F. They resist oxidation — therefore do not lose their strength appreciably through reduction of section.



High elastic properties and strength may be the primary requirement, especially for welded structures. Weight reduction may be most important. In these applications, low carbon complex alloy steels *offer distinct advantages*. Such alloy steels at equal or higher yield points show low weld-hardening tendencies. Resistance to corrosion is improved. So is ductility of the weld. And retention of toughness at sub-zero temperatures, as well as creep resistance at high temperatures, is better.



To help you get the most from alloy steels, Republic offers you its unique 3-D Metallurgical Service. You benefit from the combined experience and coordinated efforts of three groups of highly-trained men—(1) the Republic Field Metallurgists; (2) the Republic Laboratory Metallurgists; (3) the Republic Mill Metallurgists. All work hand-in-hand to help you do the job you want done with alloy steels at the lowest possible cost. Ask us about this service.

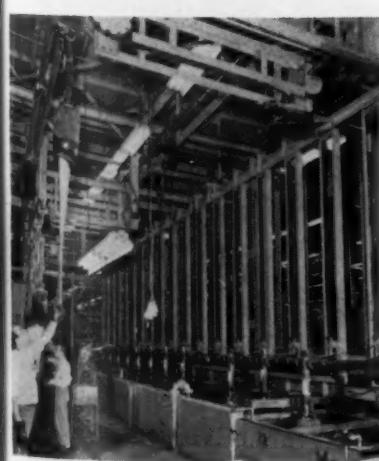
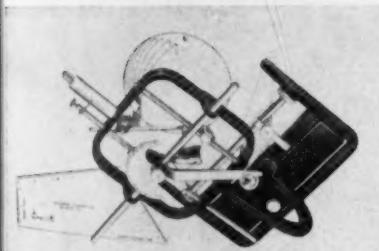
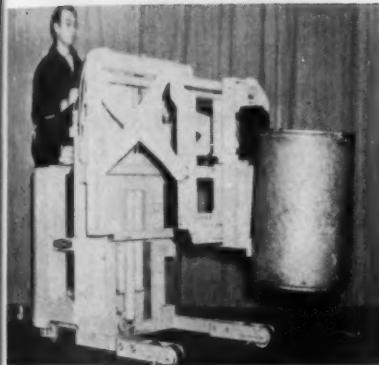
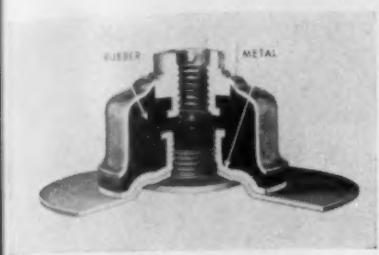
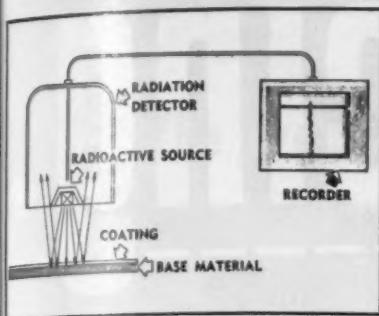
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REPUBLIC ALLOY STEELS

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Bars, Wire, Pig Iron, Steel and Plastic Pipe, Bolts and Nuts, Tubing

New Equipment

Continued



Atom-powered gage measures coating thickness

A fission product of uranium is being used in a new gage which continuously measures the thickness of metallic coatings on a rapidly moving steel strip. The atom-powered instrument is being used in Armco's continuous zinc-coating process. The gage not only continuously measures the thick-

ness of the zinc coating but does so along the length of the strip, across its width and on both sides. The weight of coating is determined instantaneously only minutes after the steel strip leaves the zinc pot. Developed jointly by *Armco Steel* and *Industrial Nucleonics Corp.*

For more data circle No. 40 on postcard, p. 145

Shock-absorbing unit for all portable grinders

The shock and jars of grinding are said to be eliminated and the quality of the finished surface improved when using a new vibration damper on right angle head grinders. The dampeners actually permit full-face application of abrasive discs

to the work. Resulting disc motion is slightly oscillatory, which gives a lapping action and a smoother, scratch-free surface. Used with raised hub disc-wheels, abrasive discs, cup wheels. *J & H Products Co.*

For more data circle No. 41 on postcard, p. 145

Device stacks barrels from 6-ft aisles

A barrel handling attachment, available on Reach-Fork trucks, makes it possible to stack barrels from aisles 6 ft wide. The engaging mechanism travels forward 24 in. through the truck's scissor arm arrangement to engage or deposit the barrel. The simple mechanical device grips under pressure and releases when the load is deposited. Loads of up to 1000 lb can be mul-

tiple stacked, tight together, from narrow aisles and in confined areas. Savings in storage space up to 33 pct have resulted in many installations. The grab attachment is readily interchangeable with standard elevating forks for pallet stacking. Loads 4 ft long weighing 2000 lb can be stacked in 72-in. aisles, 152 in. high. *Raymond Corp.*

For more data circle No. 42 on postcard, p. 145

Drawing machine permits precise ellipses

With a new drawing machine, technical illustrators and draftsmen can make accurate pictorial drawings in less time than it takes to make plan view drawings. Two simple settings, one to establish the major diameter, the other the

minor diameter, enable the user to draw mathematically precise ellipses in any ratio. Related ellipses are made by means of the instrument's rolling parallel action. *Charles Bruning Co., Inc.*

For more data circle No. 43 on postcard, p. 145

Plating conveyor recycles work, transfers it

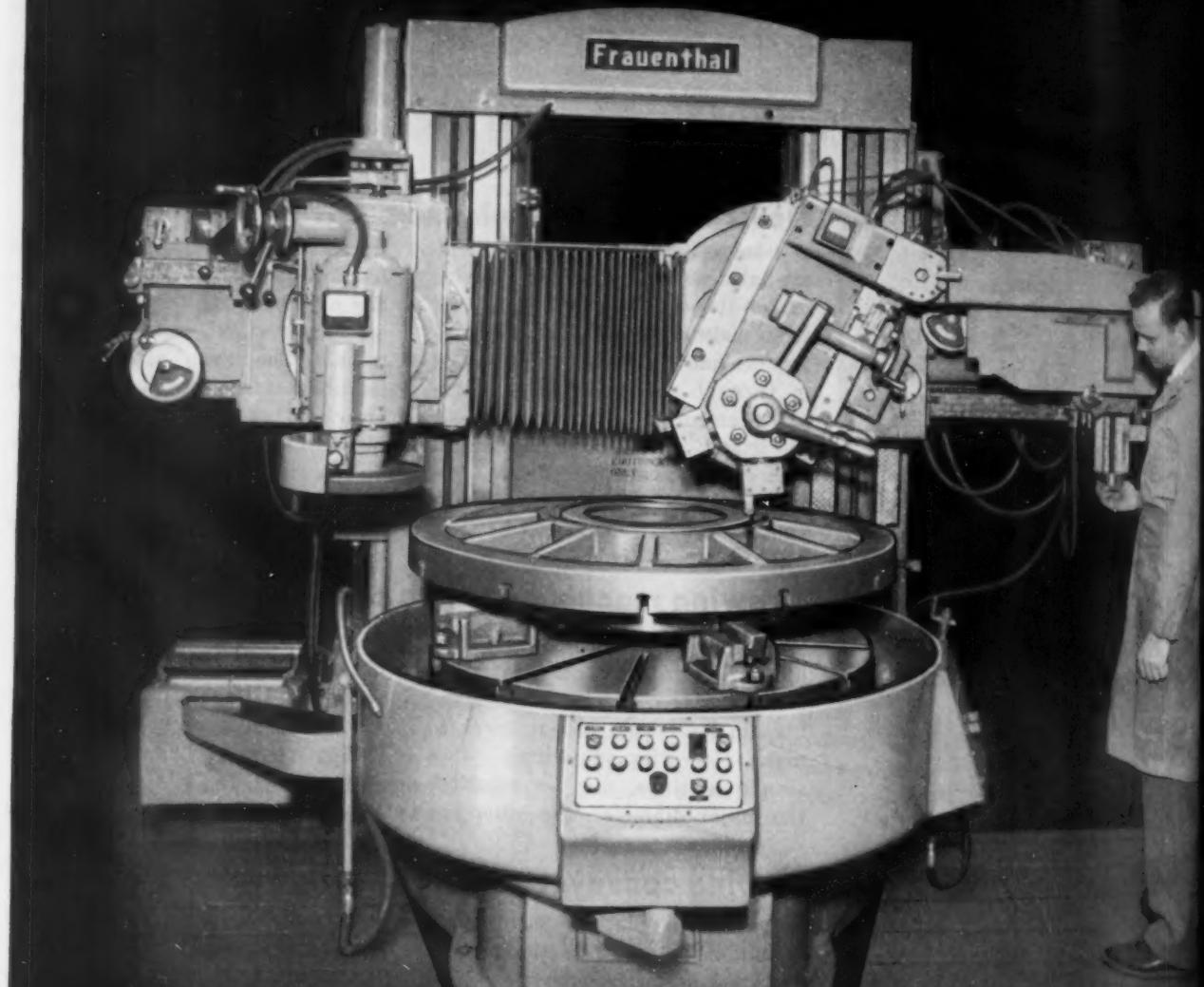
Elevator-type plating conveyor at Hamilton Standard is zinc-plating big steel propeller blades 30 to 50 pct faster than a former manual handling system. Blades are automatically transferred from and back to the plating conveyor. The transfer conveyor is selective in that it picks up only those blades that are supposed to be recycled. Transfer to the monorail is controlled by a mechanical counter located on top of the blade-holding fixture. The counter is set for the

proper number of recycles prior to loading the blade on the conveyor. Blades are recycled up to six times. Plating thickness and number of recycles are determined after test balancing the blades. Plating conveyor has a lift of 10½ ft. It is hydraulically operated, and has provisions for by-passing or delaying set-down over any station in the plating cycle. *Hanson-Van Winkle-Munning Co.*

For more data circle No. 44 on postcard, p. 145

Turn to Page 188

announcing.



Frauenthal Division • THE KAYDON

The Frauenthal Series 3100 precision turning and grinding machine

NOW AVAILABLE FOR THE FIRST TIME — here's a machine specifically designed to perform finish turning and ultra-precision grinding operations. With it, you can produce accuracies previously considered impractical, with assured concentricity of related surfaces finished on a one-setup basis!

Originally designed to meet the exacting requirements of jet engine production, the Series 3100 machine is completely new from the ground up. Its unique design opens up new possibilities for machining large work-piece, close-tolerance jobs on a mass-production basis. The Series 3100 offers the entire metal-working industry exceptional new capacity for precision turning and precision grinding.

CHECK THESE IMPORTANT FEATURES

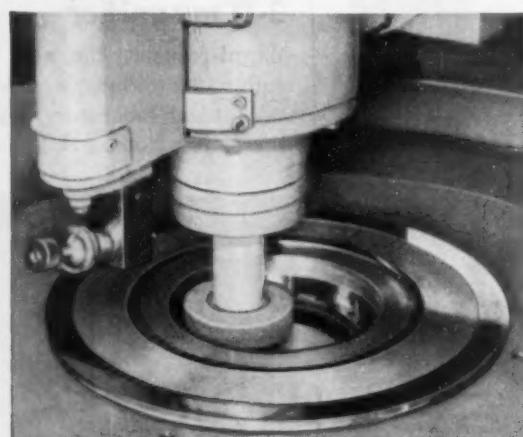
- Ultra-precision work-table bearings
- Hydraulically actuated turning slide
- Hydraulically actuated grinding slide
- Hydraulic grinding spindle
- Conveniently located controls and safety switches

... AND THIS OPTIONAL EQUIPMENT

- Hydraulic tracer control
- Electronic surface speed control
- Hydraulic wheel dressers for varied applications



Here, the operator uses a Series 3100 machine to bore out the inside diameter.



This closeup shows how the machine performs close-tolerance finish grinding of the workpiece's top surfaces and inside diameter.

May we help you?

If you'd like to have details on how the Series 3100 can offer you new tool room or production benefits — our engineers are at your service. Write for informative bulletin No. 301.



Frauenthal MULTIPLE-HEAD SUPER-PRECISION VERTICAL Grinders

ON
ENGINEERING CORP. • Muskegon, Michigan



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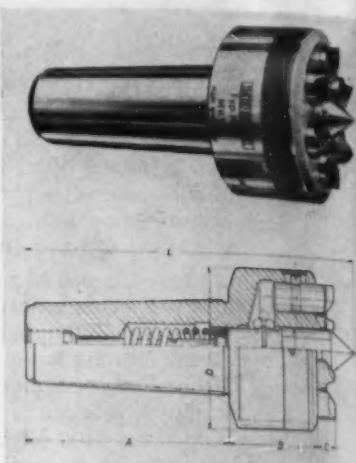
*Snap-on is the trademark of
Snap-on Tools Corporation

—New Equipment—

Continued

Driving center

With a new automatic driving center driving dog and face plate are eliminated. The job can be finished complete in one setup. Longitudinally movable driving pins grip



the workpiece regardless of irregularities of its end face. When the workpiece has been gripped, the center is automatically locked, insuring highest degree of precision and safety. *Mera Machine & Mfg. Co.*

For more data circle No. 45 on postcard, p. 18

3-D magnifier

Magni-focuser, the new 3-D binocular magnifier, is used in the mechanical laboratory for reading fine calibrations. Magnified vision

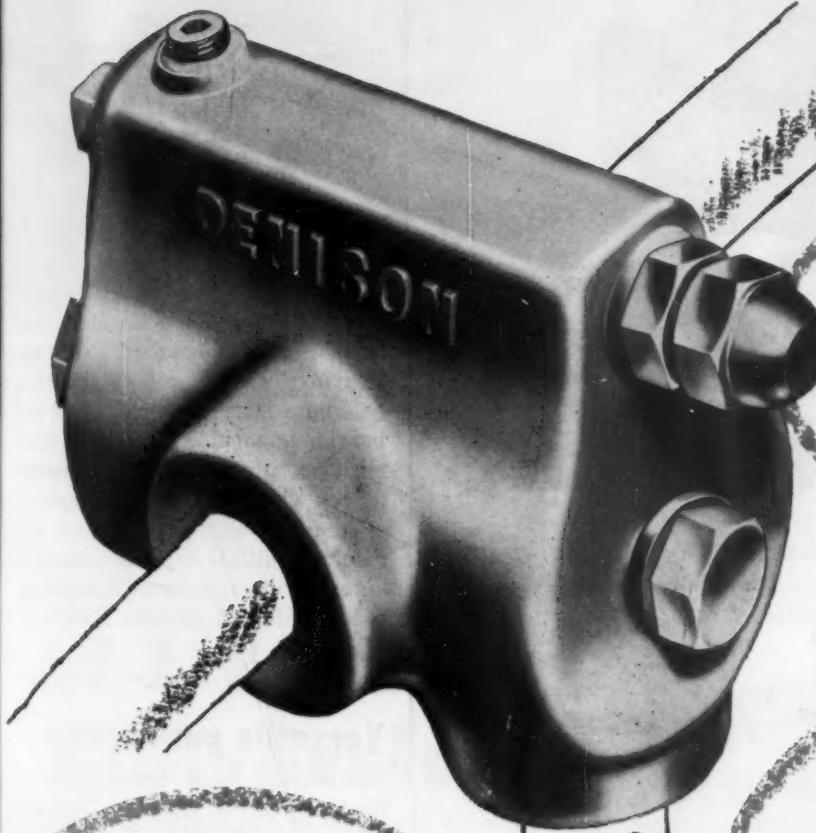


in third dimension as provided by the Magni-focuser insures greater accuracy and speeds up precision work. It allows the free use of both hands. Worn with or without eyeglasses. *Edroy Products Co.*

For more data circle No. 46 on postcard, p. 18
Turn Page

Announcing a new line of **DENISON RELIEF VALVES**

• LOW PRICE • 2000 PSI • PILOT OPERATED



ACTS FAST

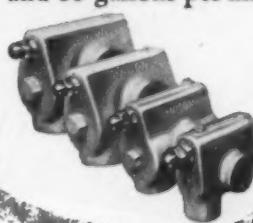
Being pilot-operated, valve action is fast, smooth and quiet. There's an improvement in efficiency, too, because of low differential between opening and closing pressures.

LOW PRICE

A new line of pilot-operated relief valves with the widest range of pressure regulation of any in use on 2000 psi circuits today. Yet they sell at an unusually low price.

4 SIZES

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Rated capacities of 10, 20, 60 and 80 gallons per minute.



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WRITE TODAY

for free Bulletin No. 152. It gives operating characteristics, capacities, sizes and dimensions of the new line of Denison Series M Relief Valves.

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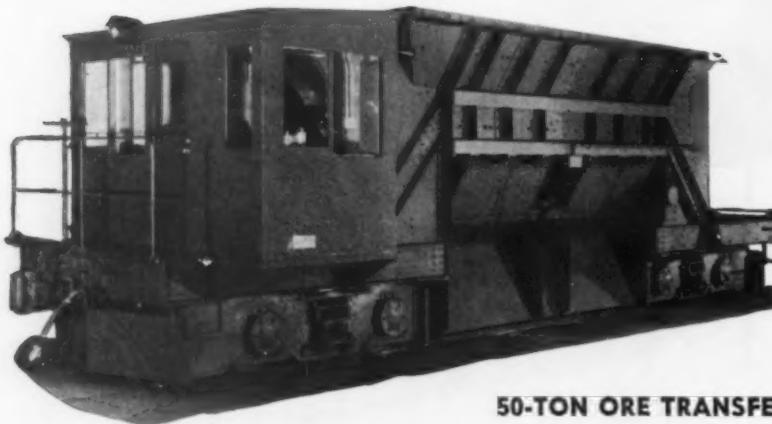
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It's Atlas Transfers for dependable, year-in, year-out service . . . for operator safety and convenience which approaches semi-automatic service.



50-TON ORE TRANSFER

This Atlas Ore Transfer is equipped with modern hydraulically-operated discharge gates and brakes. Steel plate trucks are provided. The cab is overhung at one side to give the operator a line of vision alongside the car. The car is equipped with electrically heated hoppers.



THE ATLAS CAR & MFG. CO.

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— New Equipment —

Continued

Induction motors

Complete new line of alternating current squirrel cage induction motors is made in frame sizes 326 and smaller. Design of frame sizes up to and including 326 follows the newly established NEMA standards. New motors will be very similar to present designs. They will have cast-

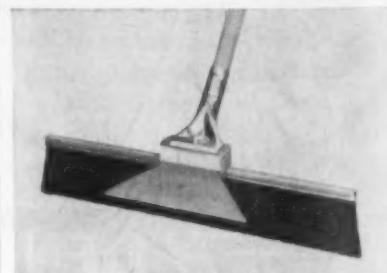


iron frames and end shields. Rotors will be pressure-cast of aluminum. Bearings will be grease-lubricated, medium series, double shielded ball bearings, capable of relubrication without dismantling the motor. Stator windings will be the random or mush wound type. Stator will receive multiple dips and bakes to assure protection against moisture, weak acids and alkalies. *Allis-Chalmers Mfg. Co.*

For more data circle No. 47 on postcard, p. 145

Versatile push broom

Lightweight push broom called a Blade Sweep is made in heat and acid resistant materials for use in plastics and glass plants, metal-working shops, foundries and other industrial plants. When worn only



the brush strip is replaced. Optional metal scraper fits on head clamp at right angles to brush strip for fast, easy removal of well-packed deposits, in one operation. Brush strip can be set in 4 different positions. *Fuller Brush Co.*

For more data circle No. 48 on postcard, p. 145

Turn Page

ALLIS-CHALMERS
Mercury Arc
RECTIFIERS

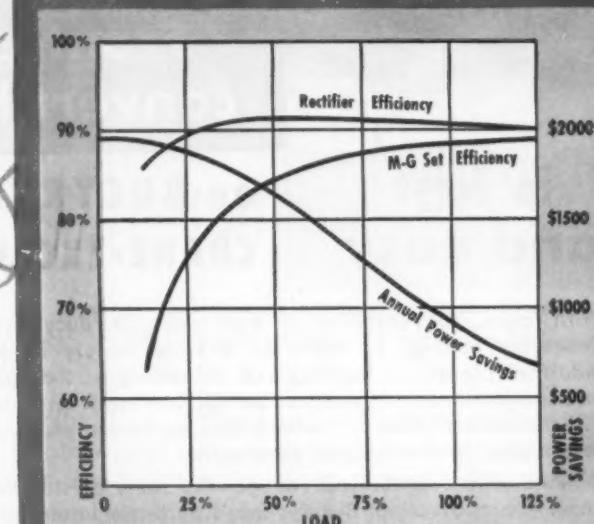
HERE'S PROOF

of Low-Loss Conversion

TO OBTAIN economical dc power for arc furnace and blooming mill auxiliaries, West Virginia Steel & Manufacturing Company recently installed mercury arc rectifiers.

The factory-packaged Allis-Chalmers unit includes duplicate 500-kw, 250-volt rectifiers, with tube, breaker, control, and metering compartments, plus dc and ac plant feeder breakers. Since transformers could be installed outdoors, the assembly departs from the usual double-ended arrangement.

Rectifiers were chosen for their high conversion efficiencies plus simplified foundation needs, easy installation and minimum maintenance. And Allis-Chalmers units incorporate continuous excitation, grid phase control, internal cooling and enameled anode seals.



Comparison of conversion efficiencies of 500-kw, 250-volt rectifier and synchronous motor-generator set. Savings shown based on 1¢ per kwh power cost. In addition, no-load idling loss of rectifier is less than one-fourth that of the motor-generator set.

Use A-C's Engineering Experience

By calling your A-C representative, you can put A-C's quarter century of rectifier application experience to work on your power conversion problems. Allis-Chalmers, Milwaukee 1, Wisconsin.

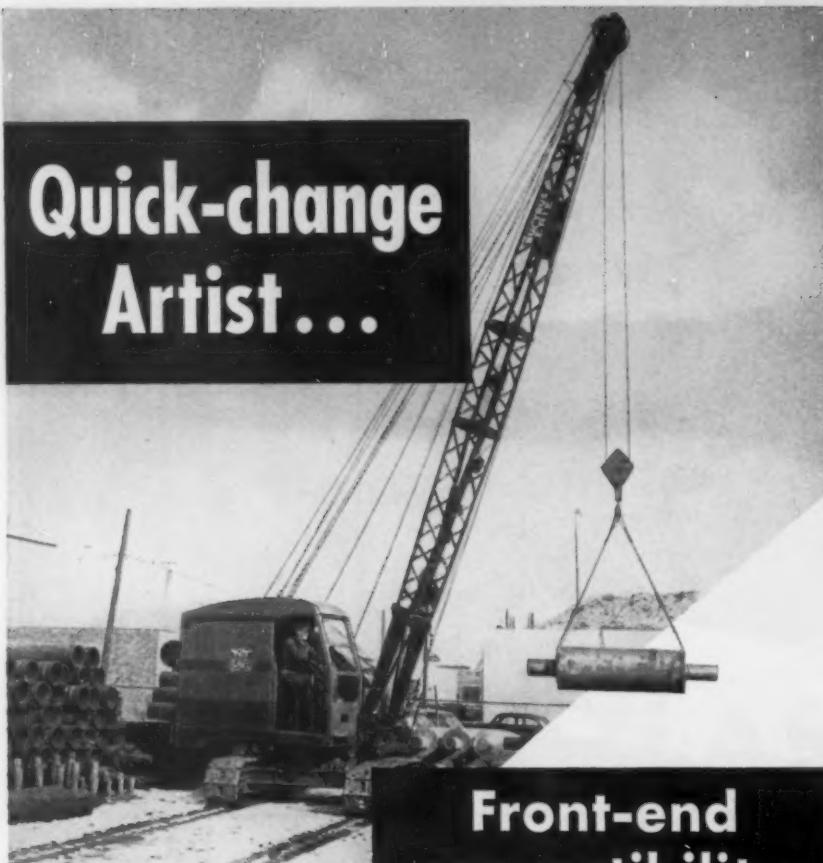
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Our Engineers Introduced Mercury Arc Rectifiers to U. S. Industry



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With quick convertibility of front-ends, a Bucyrus-Erie Crane-Excavator can go to work on a wide variety of jobs in any industrial plant . . . loading and unloading . . . digging trenches and foundations . . . stacking castings, bar stock and other material . . . stockpiling scrap . . . setting structural members — any general construction and all-round yard work.

And whatever the job you get the same outstanding performance. On excavating, Bucyrus-Erie's perfectly balanced dig-swing-dump cycle delivers more dirt per hour. On crane work you get fine, smooth control to spot loads accurately without lost motion.

See your Bucyrus-Erie Distributor soon — he'll show you how a Bucyrus-Erie Crane-Excavator can reduce your material-handling and yard-work costs.

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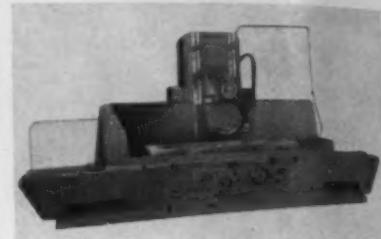
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City..... State.....
48E53

New Equipment

Continued

Surface grinder

This new hydraulic feed, cross traying head surface grinder is 24 x 25 x 96 in. Spindle is powered by 30 hp motor, giving 6000 sfpm speed with 20-in. diam wheel. Hydraulic drive motor is a 15 hp. Base and



upright column are rugged, one-piece castings. Table speed varies from 0 to 150 fpm. Table is actuated through Vickers tandem pump. One-shot lubricating system cuts oiling time to seconds. Self-contained motor driven coolant system is standard equipment. *Gallmeyer & Livingston Co.*

For more data circle No. 49 on postcard, p. 145

Acid buggy

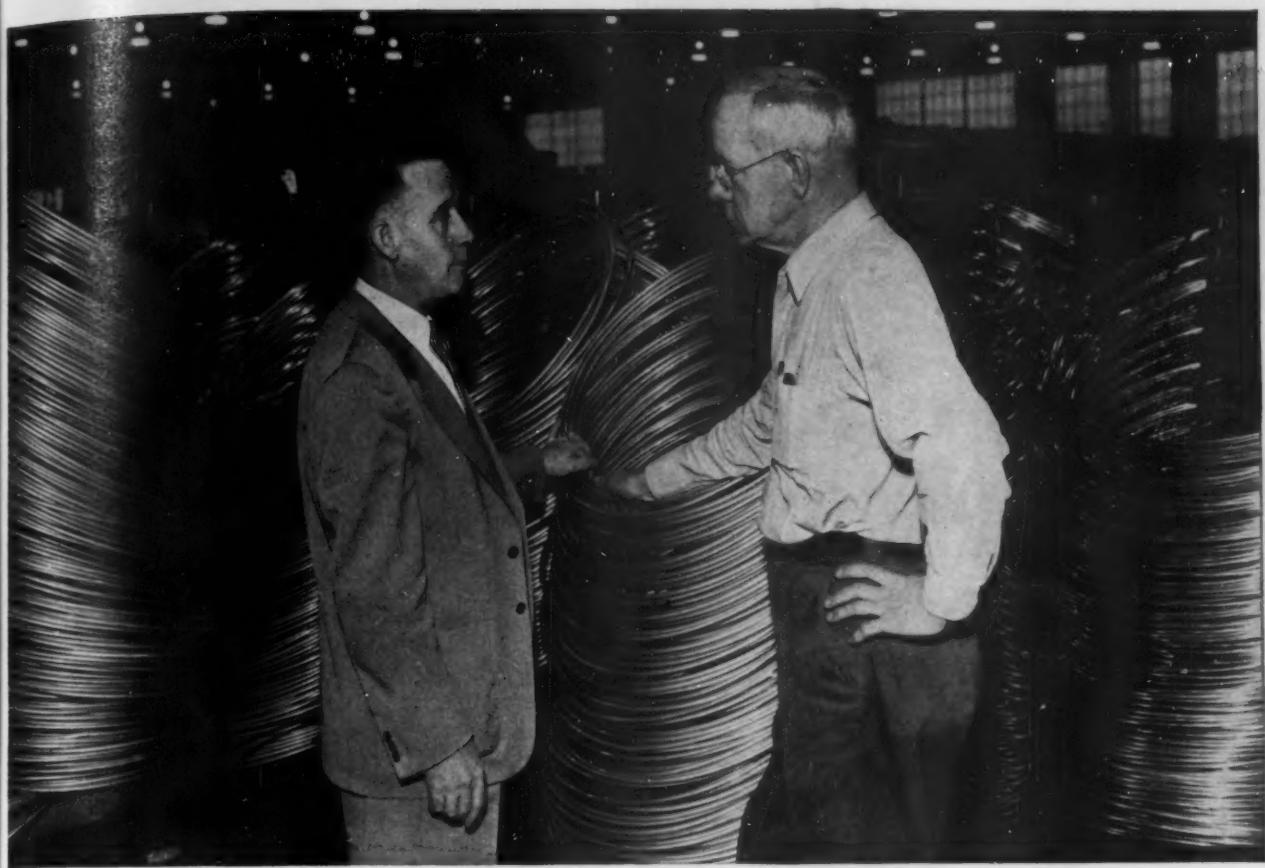
For handling corrosive chemicals the acid buggy has all Saunders type rubber-lined valves. It is completely equipped with tow bar, axles, wheels, 6.00 x 16 tires, four 50-ft lengths of acid hose with



nozzles, overflow funnel, gage glass and fittings, pneumatic controls, air filter, air gage, and gage board, and 75 ft of ½ in. diam hose. Produced in a variety of capacities, it is completely mobile for convenient in-plant materials handling and inter-plant hauling. Tank is rubber-lined inside and out. *Automotive Rubber Co., Inc.*

For more data circle No. 50 on postcard, p. 145

Turn Page



There IS a difference in tubing ... Tubemanship IS that difference!

"Tubemanship?"

"Well, sir, I've probably got a different slant on Tubemanship than you have. To me, it means skill and experience. After all, I've been with Wolverine for 34 years. And I've learned a lot! I've found how people recognize a good job. Customers, for example, keep coming back and that means steady work for me and the boys."

"Now you probably have a different angle on Tubemanship than I have. You see it from upstairs."

"That's right, Jim. I do see it from 'upstairs'. I know how we're moving ahead in new developments. How we're always ready to investigate new and better ways of doing things. That's how we came up with Wolverine Trufin* and the Spun End Process.† They're exclusive with us and they represent the type of thinking that keeps Wolverine right out in front of the entire tubing industry!"

"And then, there's inspection and quality control from ore or steel strip to finished product. I guess you can say that Tubemanship combines

a lot of things—skill, experience, research, equipment, quality control and a knowledge of the tube market."

What Does It Mean to You? Tubemanship means satisfaction—knowledge that when you invest in a Wolverine tubular product—of copper, aluminum or electric-welded steel—it will do its job day after day—year after year. Remember: there IS a difference in tubing—and Tubemanship IS that difference!

WOLVERINE TUBE DIVISION of Calumet & Hecla, Inc., 1477 Central Ave., Detroit 9, Michigan.

*REG. U.S. PAT. OFF.

†A PATENTED PROCESS RE. 22465

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ontario.

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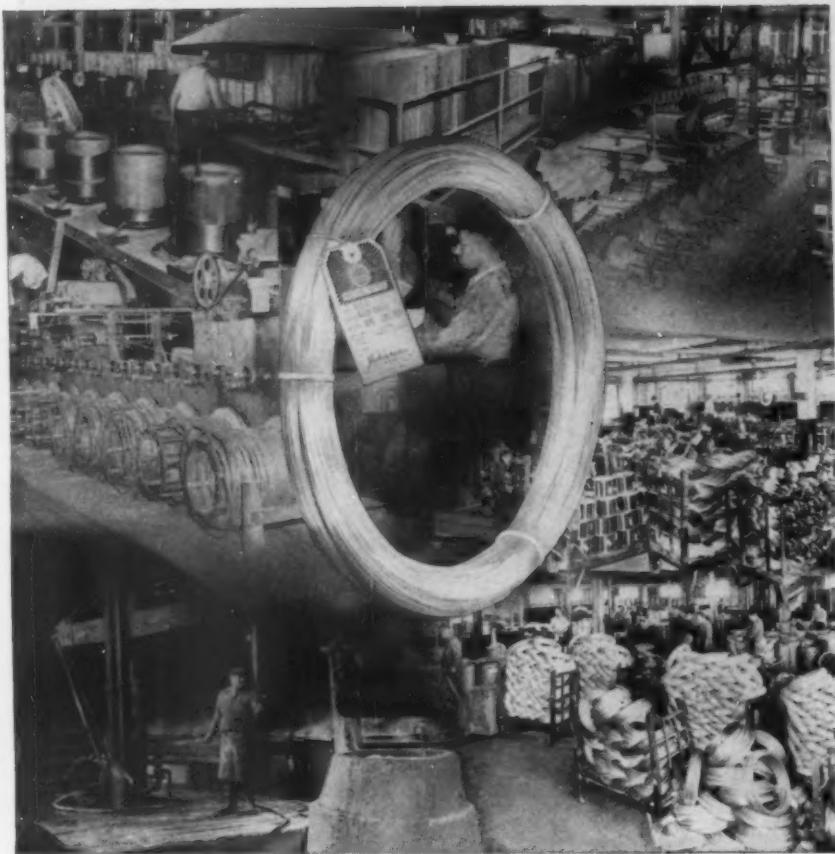
WOLVERINE TUBE DIVISION
OF CALUMET & HECLA, INC.
Manufacturers of Quality-Controlled Tubing

PLANTS IN DETROIT, MICHIGAN, AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES.

Export Dept., 13 E. 40th St., New York 16, N.Y.

New Equipment

Continued



Most folks know how to say
nothing, but few of them when.

Our sales representatives are paid to talk, but always when they know what they are talking about. They may not be able to suggest an answer to some of the complex problems of the affairs of state, but, when they have something to say about high carbon wires they speak from the book of knowledge—compiled through more than a quarter of a century of Johnson experience in the drawing of the highest grade specialty wire. These are "custom made" wires, made by special equipment employing special skills and a conscientious endeavor to make the best—better.

JOHNSON STEEL AND WIRE COMPANY, INC.

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Dayton Chicago Atlanta Houston Tulsa Los Angeles

A SUBSIDIARY OF PITTSBURGH STEEL COMPANY

Phosphatizing process

A new process makes it possible to phosphatize steel and still apply silicone finishes. It is built around Divobond and is claimed to clean, rust-proof and give greater finish adherence to the metal all in one spray application. In addition to its use with silicone paints it is expected that Divobond will find general application as a one-shot cleaning, rust-proofing and paint-adhering process. *Diversey Corp.* For more data circle No. 51 on postcard, p. 145

Deep groove joints

The second electrode in a new line of electrodes with powdered metal in their coatings is the Jetweld 2 designed for welding butt and deep groove joints. It has excellent wash-in, easy slag removal and produces a smooth, clean, flat cover pass. Welding speeds can be increased 30 pct because of these qualities and because of the high deposition rate made possible by the powdered metal coating. *Lincoln Electric Co.* For more data circle No. 52 on postcard, p. 145

High heat uniformity

New line of standard kiln type ovens for baking, heating, drying and curing are designed to include several custom-built features not always found in standard ovens. Construction features make it pos-



sible to maintain a high degree of heat uniformity while substantially cutting fuel consumption. The oven is available in six sizes, with work space ranging from 4 ft wide x 4 ft deep x 6 ft high to 6 ft wide x 7 ft deep x 6 ft high. It operates on either gas fuel or electricity. *Michigan Oven Co.* For more data circle No. 53 on postcard, p. 145

Turn Page

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A 46-page, flat-opening, flexible-bound Reference Book that should be in the hands of every Engineer who specifies or uses Bronzes. Due to the cost of preparing and pro-

ducing this useful book, we can only send it to those who request it in writing on their business letterheads—and remember, there's over 43 years "specialized experience" behind us in casting Bronzes.

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Bondaloy Solder Preforms apply solder in an accurately prefabricated shape—put exactly the right amount of solder in exactly the right place. None wasted—no excess to clean up later. You save soldering time. Just drop the preform in place and apply heat automatically.

The result is perfect joints on a high production basis with a minimum of rejects and service failures.

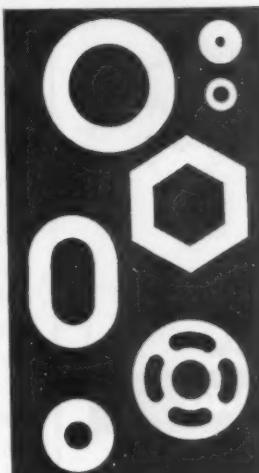
Send us your prints—we'll make recommendations or ship you samples for trial.



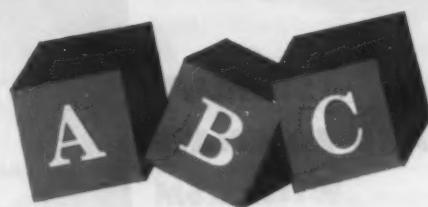
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TO REDUCE PRODUCTION COSTS . . .

**SIMPLIFY
AND ELIMINATE
WITH KSM
STUD WELDING**

Time-consuming drilling, tapping, grinding and the need for elaborate jigs and fixtures can be eliminated when stud welding is specified for fastening applications.

Both design and assembly are simplified, production is boosted while substantial savings in labor and material costs are realized.

Stud welding is the efficient, fast application for plain studs, male or female threaded studs, with or without shoulders, eye-bolts, J-bolts, pins and a wide variety of square, rectangular, straight or bent shapes. Its applications are unlimited and have been thoroughly proved on countless applications.

Studs can be applied at the rate of six per minute and located within tolerances as close as .005 inches.

True 90 degree positioning is assured. Weld strength exceeds that of the stud and the parent metal.

Some typical uses of stud welding are suggested and types of studs available are shown here.

Whether or not your needs are illustrated, think in terms of stud welding. Investigate what it can do for you. Get the complete story of KSM engineered benefits.

Write KSM Products, Inc., Merchantville 8, N.J.



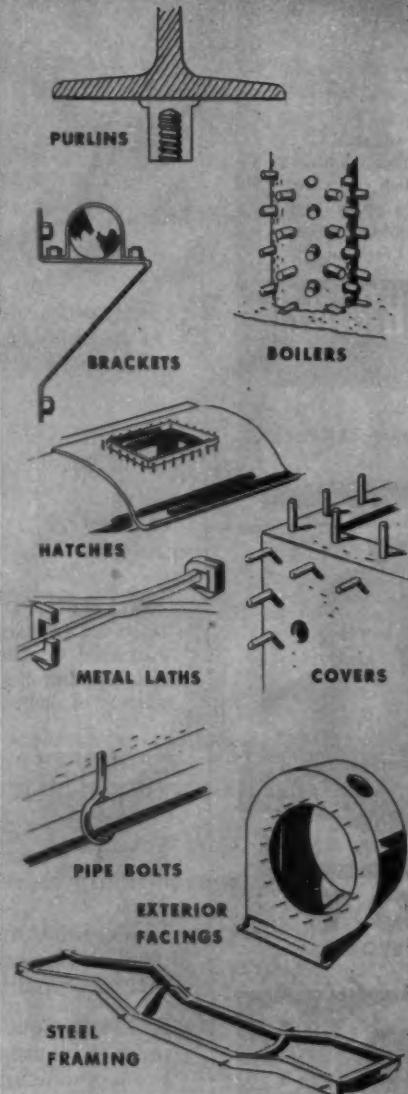
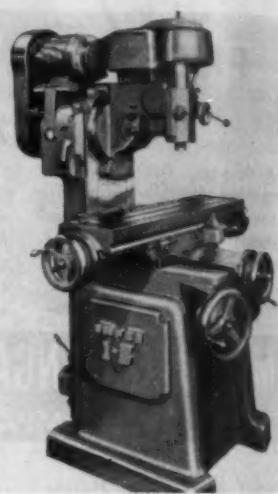
K S M
STUD WELDING

New Equipment

Continued

Vertical mill

New vertical mill is practical for both production and tool room milling. The Impco head is vertically adjusted by a counter-balanced ram, said to give greater accuracy and rigidity because of the greater scraped bearing surface area. For



ample range and versatility the table working surface is 10 x 40 in., maximum longitudinal table movement is 24 in., cross movement is 12 in. Range of opening from table to spindle nose is 4 1/8 to 18 1/4 in. Spindle quill diameter is 3 1/2 in. with 5-in. travel. Speeds range from 75 to 3000 rpm. The machine weighs 3100 lb and is massively designed throughout. *Industrial Metal Products Corp.*

For more data circle No. 54 on postcard, p. 145

Pickling compound

Designed to reduce the hazards and discomforts of pickle rooms, AA Compound produces a foam blanket on the surface of the acid bath, smothering the fuming, fogging and spraying action which is damaging to men and equipment. The white, granular powder compound is dust-free and slightly acid. It is added directly to the pickle bath in quantities as small as 3 oz to 10 gal of acid solution. The foam blanket produced is stable and long-lasting. Acid action is not reduced in any way. The compound rinses freely and completely. *Cowles Chemical Co.*

For more data circle No. 55 on postcard, p. 145



Tractor shovel speeds bulk handling

A nimble-footed, hydraulically actuated 12 cu ft tractor shovel speeds the one-man handling of bulk materials. The Load-Plus offers lifting capacity of 1200 lb; faster speeds—13.88 mph in reverse, 7.66 mph forward; shortest turning radius—6½ ft; high dumping clearance of 4½ ft; reach of

2 ft 7 in. Rear-wheel steering provides quick turn-arounds. Instant changes of speed and travel in either direction are possible. Bucket can work flush against walls or into corners for clean pick-up; crowds forward as it rises. *Jaeger Machine Co.*

For more data circle No. 56 on postcard, p. 145

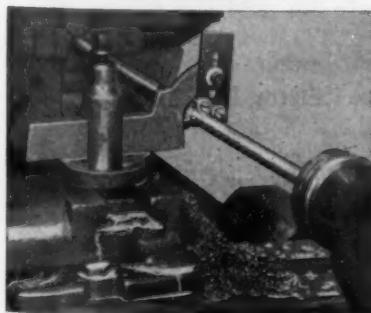
Bronze electrode

Highly versatile Bronzochrom electrode, EutecTrode 1850, has been developed for high strength joining and for frictional and corrosion resistance on a wide variety of base metals. The electrode produces copper base deposits alloyed with silicon, manganese and chromium, etc., which increase tensile strength and give additional resistance to wear and corrosion. Hardness as deposited is 130-140 Bhn and this can be increased by cold working to 230-240 Bhn. *Eutectic Welding Alloys Corp.*

For more data circle No. 57 on postcard, p. 145

Toolholder

A combination toolholder and follow-rest is designed for turning long, small-diameter shafts quickly and easily. The tool is adjusted instantly by dropping the roller plate on the shaft and tightening a single screw. The roller prevents



the shaft from chattering, springing out or climbing over the tool bit while being turned. The follow-rest is for turning shafts up to 1½ in. diam. Close diameter tolerances may be held the entire length of the shaft. Use of ordinary, bulky machine steady-rests are eliminated. *Pull Gear Co.*

For more data circle No. 58 on postcard, p. 145

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GREAVES
... WILL BE YOUR CHOICE!

"The Most Mill For The Least Money"

Now you can make the same painstaking comparison that sold and satisfied leading plants on Greaves 2H plain and universal milling machines. A free chart cross-compares 22 significant specifications . . . including speeds, feeds, power and capacity . . . on each of the eight leading milling machines.

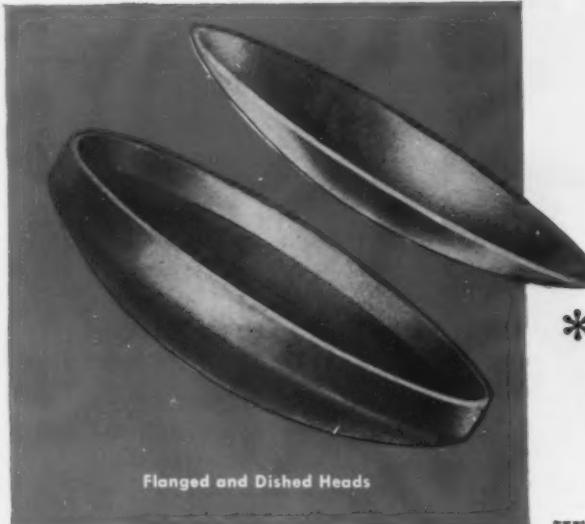
Make your own comparison . . . in your office, out on the factory floor or right out of our competitors' catalogs . . . we're convinced you'll find that Greaves is your best buy!

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Please send me the COMPARISON CHART.

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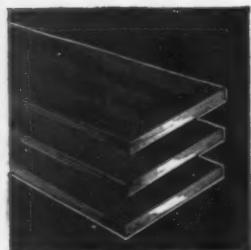
heads---you win



Flanged and Dished Heads



Stainless-Clad Steel Plates



Alloy and Carbon Steel Plates



Large Diameter Welded Steel Pipe

*when they're made by

CLAYMONT

Whatever your needs in flanged and dished heads, you're a winner every time when you call for heads by Claymont.

We can always meet your most exacting specifications because with us the spinning of flanged and dished heads is more than just a job—it's an art into which we put the most painstaking care and specialized know-how.

Our flanging department can supply you with flanged and dished heads in diameters from 9 inches to 19 feet and in gauges from 3/16-inch to 6 inches. Made in carbon steel, alloy steel or with stainless steel cladding. We are also prepared to handle head forming operations on both ferrous and non-ferrous metal circles supplied by the customer.

Other Claymont products include Stainless-Clad Steel Plates, Alloy and Carbon Steel Plates, Large Diameter Welded Steel Pipe.

Write or call Claymont Steel Products Department,
Wickwire Spencer Steel Division, Claymont, Delaware.

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PRODUCTS OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION



THE IRON AGE SUMMARY . . .

- 1 Pickup in rate of new orders encourages producers
- 1 Order pattern indicates progress on inventories
- 1 Oil country goods remain hottest of steel items

Steel producers are again beginning to express limited optimism on the outlook for a pickup in business. Also they see a few signs here and there of strike hedging although they admit it isn't yet enough to get excited about.

Optimism is based largely on the fact that the ingot rate has leveled off and the market has been stabilized, as THE IRON AGE has been pointing out for several weeks.

Of even more significance now is the fact that the rate of new orders is definitely picking up, although not all companies are profiting equally. For some companies booking of new business is supporting current operations for the first time in many months.

Chicago area producers appear to be enjoying the strongest and best balanced market of major producing centers. But Pittsburgh producers are more encouraged than they have been for many weeks. Detroit business volume is good but badly unbalanced among both producers and consumers.

Hottest product at the moment, and perhaps for the balance of the year, is oil country goods. Producers look for a good market throughout 1954. Major oil companies are back in the picture after a period of inventory correction during second quarter. Reason there was no slackening in orders for second quarter delivery is that small independents who had been hurting for material stepped into the breach and took advantage of its availability while the big guys chose to look the other way.

Sheets still require plenty of selling. Competition in the Detroit market is terrific. Stainless shows no sign of a significant pick-up and it begins to look as if stainless and specialty steels won't come to life again until next quarter.

Tinplate is staging a comeback. There may be a bit of strike hedging, but that isn't the whole story. The crop outlook appears to be good and the can companies are getting ready for it. Some tinplate of heavier than normal gage is being bought by automotive com-

panies as a substitute for terne plate which isn't available due to limited capacity.

There has been a definite upturn in the automotive market in terms of total tonnage being booked, but concentration of orders among big consumers is causing some steel people concern. While big firms are increasing their buying, smaller companies have been and are staying practically out of the market. Some medium sized firms are reentering the market. Here are some samples:

One company that averaged 148 tons of carbon bars per month through 1953 started out 1954 with blanks for the first 3 months, then placed orders for 85, 25, and 20 tons for the next 3 months. Total tonnage isn't great, but it shows renewed interest.

Another customer that averaged 55 tons a month placed only 30 tons so far this year. Another averaging 78 tons in 1953 stayed out in January, bought 100 tons in February, 190 tons in March, nothing in April, but 105 tons again in May.

But a big producer that averaged over 4500 tons per month in 1953 has booked over 5000 tons per month in several months this year.

Steel Output, Operating Rates

	This Week†	Last Week	Month Ago	Year Ago
Net Tons Produced (000 omitted)	1,604	1,637	1,622	2,259
Ingot Production Index (1947-49=100)	99.9	101.9	101.0	140.6
District Operating Rates				
Chicago	76.5	78.5	72.5	105.5
Pittsburgh	68.0	71.0	73.0	97.0
Philadelphia	59.0	60.0	59.5	95.5
Valley	66.0	64.0*	63.0	102.0
West	70.5	56.5*	76.0	103.0
Detroit	75.0	72.0	70.0	105.0
Buffalo	67.5	67.5	67.5	94.0
Cleveland	71.0	73.0	63.0	97.0
Birmingham	56.5	56.5	77.0	102.0
S. Ohio River	80.0	74.0	75.0	88.5
Wheeling	92.0	90.0*	82.0	102.0
St. Louis	72.5	55.5	62.0	92.0
East	51.0	51.0	31.0	121.0
Aggregate	67.5	68.5	68.0	100.5

Per cent of capacity for weeks in 1954 is based on annual capacity of 124,330,410 net tons as of Jan. 1, 1954. Per cent of capacity for last year is based on annual capacity of 117,547,470 tons as of Jan. 1, 1953.

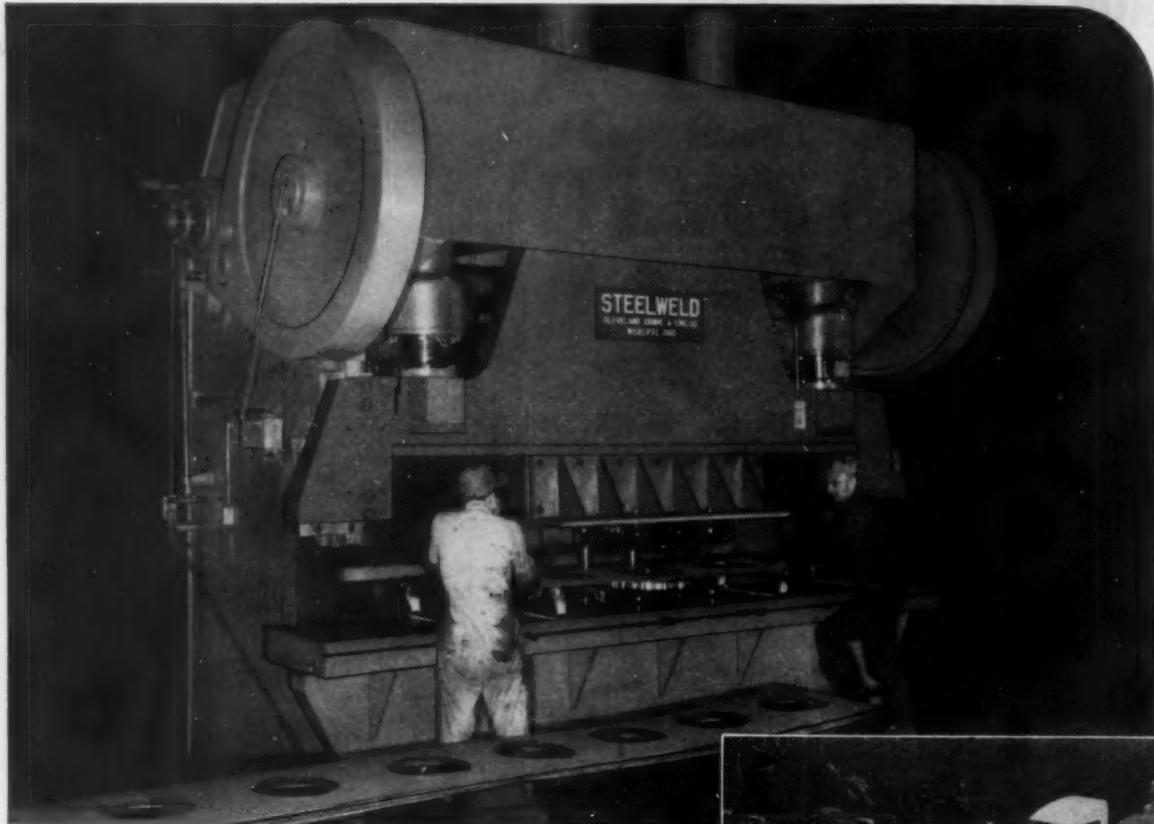
* Revised.

† Tentative.

Punches 15" Holes For Warner & Swasey Gradalls

Also Performs Bending and Flanging Operations

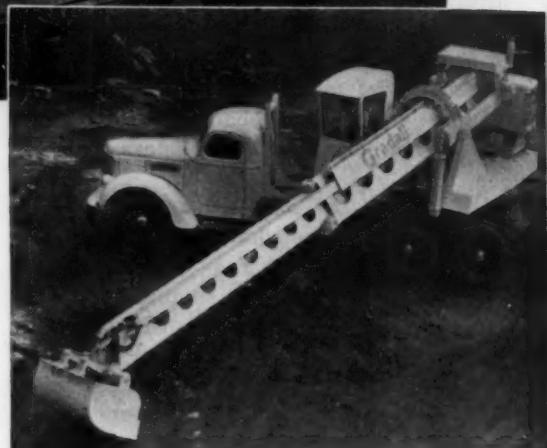
Flanging 15" diameter holes in outer boom plates of 3/16" steel. The holes were punched previously on this press.



Practically all of the steel plate on Warner & Swasey Gradalls, manufactured at their New Philadelphia, Ohio plant, is formed, punched and flanged on a Steelweld Press which is designed to brake steel plate up to 16' x 1/2".

One of the more interesting jobs done on this machine is the punching of 15" diameter holes in Gradall boom plates, followed by a flanging operation. Through use of special movable punches, many smaller holes of various sizes are made at a time, in locations as desired.

The versatility of Steelweld Presses to handle efficiently many varied operations has proven of tremendous advantage to many users. You, too, may find the many features of these machines of great help. A representative will be glad to give you the details.



Gradall ready for action. Has 1/2 yd. bucket and 24 ft. telescoping boom that lifts, tilts, and turns 360° around truck.

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Markets at a Glance

Tin Plate For Autos . . . Due to limited availability of terne plate, the automotive industry is using heavy tinplate for making air cleaners, oil filters, cartridges, and other stamped parts. Jones & Laughlin and other tinplate producers are making an electrolytic product about twice the thickness of regular plate for this purpose. The product is painted before installation in automobiles. Can companies are experimenting with coiled tinplate and may ultimately adapt some equipment to use it in coil as compared with sheet form.

Cut Carbide Prices . . . Kennametal, Inc., reduced prices 10 pct on standard and modified carbide tool blanks, inserts for mechanically held tools and other items made of Kennametal. This 10 pct reduction in basic carbide price is also reflected in the prices of brazed and mechanically-held tools, dies, and other products in which cemented carbide is the essential component.

Cut Scrap Freight Rates . . . Railroad freight rates on iron and steel scrap in the Eastern Territory (east of the west bank of the Mississippi River and north of the Ohio and Potomac Rivers) will be reduced about 15 pct the middle of June, Institute of Scrap Iron & Steel reports. Rate cut follows a conference between Eastern Territory railroads and steel mills. Reduced rates will apply to a new minimum carload basis of 80,000 lb. Rates on the present minimum basis of 44,800 lb will not be adjusted but the Institute is working on about 300 point-to-point reductions on the 44,800 lb carload basis. Switching rates in excess of \$1 per ton will also be reduced about 15 pct, but water-compelled and motor truck competition rates will not be affected.

Smelt Clay . . . Production of aluminum-silicon alloy by smelting clay in an electric furnace is being undertaken on a trial basis at the pilot plant of the National Metallurgical Corp. at Springfield, Ore. The firm was formed by American Smelting and Refining Co. and Apex Smelting Co.

Iron Production Drops . . . February 1954 pig iron output in Canada amounted to 182,050 net tons, 60 pct of rated capacity and compares with 214,999 tons (66.3 pct) for January. Production for February included 146,980 tons of basic iron, 3092 tons of foundry iron, and 31,978 tons of malleable iron. For the first 2 months this year pig iron production totalled 397,049 net tons.

Government Buys Titanium . . . New agreements between the Government and titanium suppliers will be the basis for General Services Administration purchase of up to 1.85 million lb of the metal by June 30. GSA has contracted to buy up to 1.25 million lb from E. I. duPont de Nemours & Co., and a maximum of 600,000 lb from Titanium Metals Corp. of America. Market price at the time of delivery will be paid. Metal being bought by GSA at this time is not expected to remain under federal ownership for very long. It will be available for resale to industry.

Trim Wide-Flange Price . . . Phoenix Iron & Steel Co., Phoenixville, Pa., has reduced its price for carbon steel wide-flange beams to \$4.15 per 100 lb. The \$16 per ton cut makes the firm competitive with other eastern producers of this item.

Ohio Construction Booms . . . Spring boom in construction industry is keeping many Ohioans busy. According to F. W. Dodge report, contract awards for first quarter in the Buckeye State are running 10 pct ahead of a similar period last year. Heavy engineering construction is up 15 pct; non-residential 10 pct and residential 8 pct.

Close Blast Furnaces . . . U. S. Steel Corp. banked its No. 1 blast furnace at Homestead Works Apr. 24 as a result of business decline. Its No. 1 blast furnace at Ohio Works was blown out Apr. 23 for complete relining. Blast furnace No. 2 at Ohio Works resumed production Apr. 21 following repairs.

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite prices				
Finished Steel, base . . .	4.634	4.634	4.634	4.376
Pig Iron (gross ton) . . .	\$56.59	\$56.59	\$56.59	\$55.26
Scrap, No. 1 hvy (gross ton) . . .	\$27.25	\$26.17	\$24.50	\$38.83
Nonferrous				
Aluminum, ingot . . .	21.50	21.50	21.50	20.50
Copper, electrolytic . . .	30.00	30.00	29.875	29.75
Lead, St. Louis . . .	13.80	13.80	13.55	12.30
Magnesium, ingot . . .	27.75	27.75	27.75	27.00
Nickel, electrolytic . . .	63.08	63.08	63.08	63.08
Tin, Straits, N. Y. . .	93.25	97.00	94.50	98.00
Zinc, E. St. Louis . . .	10.25	10.25	10.25	11.00

Nonferrous Markets

Tells More on Long-Range Stockpiling

Stockpile announcement immediately bolstered markets . . . Now ODM sheds more light . . . Will seek best price . . . Try to avoid undue fluctuation—By R. L. Hatschek.

Terrific effect a government stockpiling program can have on metal markets was amply demonstrated recently when the mere announcement of a long-range program was made. It immediately shored up lead and zinc—neither of which is really bright right now—without any commitments being made.

Now realistic metal producers want to know more.

Defense Mobilizer Arthur S. Flemming, at the request of Montana's Sen. Murray, last week threw some light on the scene.

Long term objectives are to be calculated on the basis that wartime imports would be practically eliminated. Buying will be over a long period at prices favorable to the government. Minimum objectives will continue to be met as rapidly as possible.

Materials bought under both long and short term goals will go into a common stockpile.

Newly mined domestic materials will receive preference and the method for insuring this will be determined case by case. The "Buy American" clause will be invoked.

Upgrading will be done through normal commercial channels.

No rules have been set up for aiding distressed industries or in-

MONTHLY AVERAGE PRICES

The average prices of the major non-ferrous metals in April, based on quotations appearing in THE IRON AGE were as follows:

	Cents Per Pound
Electrolytic copper, Conn. Valley	29.965
Lake copper, delivered	30.00
Straits tin, New York	96.131
Zinc, East St. Louis	10.250
Zinc, New York	10.750
Lead, St. Louis	13.710
Lead, New York	13.910

dividuals and, in general, market prices will not be exceeded. But this does not rule out the possibility of special treatment. Goals will be under frequent review and may be revised up or down but the government will make every effort to avoid violent fluctuations.

Zinc Quiet . . . Greatest and most beneficial effect of this new stockpiling program will no doubt be on the zinc industry which is currently staggering along under a 200,000-ton slab stock. And government directives may be issued after next week's hearings before the House Committee on Interior and Insular Affairs.

Meanwhile, the market remains quiet here, fairly steady in London. Some sales are noted, generally in carload quantities, with the general preference for an average price basis.

Expect More Lead Sales . . . Demand was characterized as "moderate" for lead last week with a fair tonnage changing hands. But total sales so far make sellers feel that they'll be hearing from more customers this week in a late rush for May delivery. As with zinc customers, lead buyers seem to favor the average price.

Copper Scrap Up . . . Two jobs last week pushed up ingot maker buying prices for copper and brass scrap. There was some speculation in the trade that ingot prices might follow the trend, though at press time these quotations had not been increased.

Custom smelter and ingot maker buying prices are now as high as 27¢ per lb for No. 1 copper, 25½¢ for No. 2 copper and 21½¢ for No. 1 composition. Dealers are also paying more for copper and brass scrap and a further boost is likely. Foreign competition got most of the blame for the higher prices.

Secondary ingot shipments in March hit the highest point since April 1953. Total for the month was 23,653 tons as compared to 19,920 tons in February.

Market for refined copper continues fairly brisk for May delivery and reports are that some buyers have had to do some searching.

Ask Aluminum Limit . . . Like copper, heavy shipments of aluminum scrap are going overseas. And it hurts, say aluminum smelters. Their Washington advisory committee last week unanimously recommended establishment of "short supply" export quotas for scrap.

Magnesium Bounces . . . Except for castings, magnesium seems to be coming back to life after a rugged skid early in the year. Shipments of wrought products in March were 645 tons, above the average for fourth quarter '53 but not enough to pull first quarter tonnage over the previous quarter's. Totals were: Fourth quarter 1953, 1821 tons; first quarter 1954, 1660 tons.

Production, too, snapped back in March, topping all months since the government plants were shut down last June. Month's output was 650 tons, bringing the quarterly total to 18,847 tons.

NONFERROUS METAL PRICES

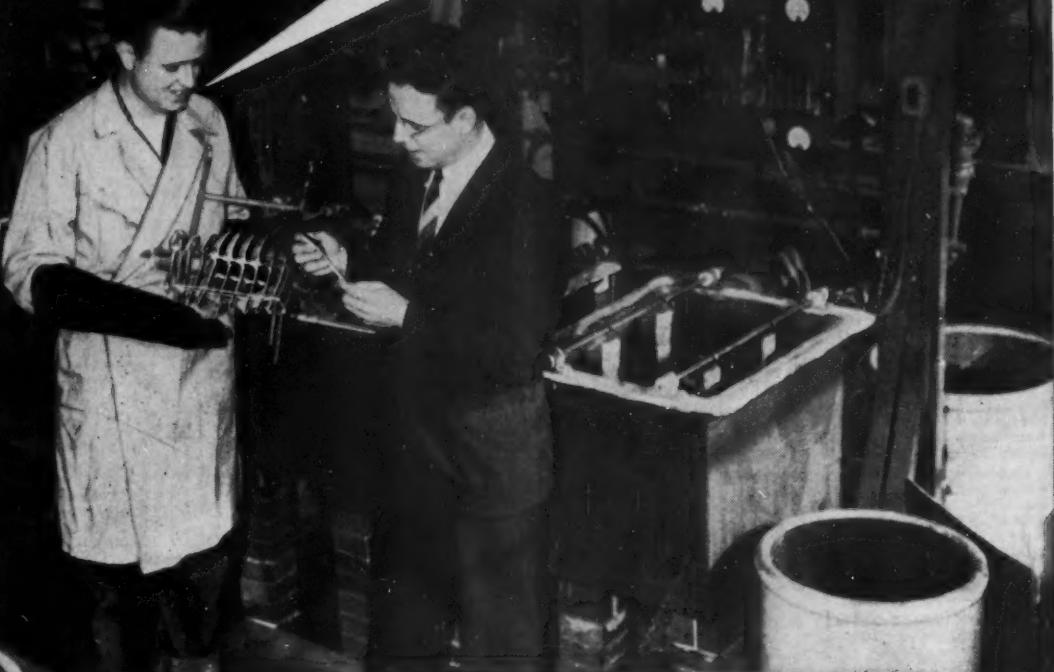
(Cents per lb except as noted)

	Apr. 28	Apr. 29	Apr. 30	May 1	May 3	May 4
Copper, electro, Conn.	30.00	30.00	30.00	30.00	30.00	30.00
Copper, Lake, delivered	30.00	30.00	30.00	30.00	30.00	30.00
Tin, Straits, New York	95.00	94.75	94.25	....	93.25	93.25*
Zinc, East St. Louis	10.25	10.25	10.25	10.25	10.25	10.25
Lead, St. Louis	13.80	13.80	13.80	13.80	13.80	13.80

Note: Quotations are going prices

*Tentative

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Nonferrous Prices

(Effective May 4, 1954)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.125 in. and thicker, 2S, 3S, 33.9¢; 4S, 36.0¢; 52S, 35.2¢; 24S-O, 24S-OAL, 37.0¢; 75S-O, 75S-OAL, 44.7¢; 0.081-in., 2S, 3S, 33.1¢; 4S, 37.7¢; 52S, 39.9¢; 24S-O, 24S-OAL, 35.4¢; 75S-O, 75S-OAL, 46.9¢; 0.082-in., 2S, 3S, 37.0¢; 4S, 41.8¢; 24S-O, 24S-OAL, 46.9¢; 75S-O, 75S-OAL, 58.4¢.

Plate: 1/4-in. and Heavier: 2S-F, 3S-F, 32.4¢; 4S-F, 34.5¢; 52S-F, 36.4¢; 61S-O, 35.6¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 44.3¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.5¢ to 82.8¢; 12 to 14, 37.2¢ to 90.0¢; 24 to 26, 39.9¢ to 51.2¢; 36 to 38, 47.2¢ to 51.8¢.

Rod, Rolled: 1.064 to 4.5-in., 2S-F, 3S-F, 43.8¢ to 37.2¢; cold-finished, 0.375 to 3.449-in., 2S-F, 3S-F, 47.6¢ to 39.8¢.

Screw Machine Stock: Rounds, 11S-TS, 1/2 to 11/32-in., 59.6¢ to 47.0¢; 5/16-in., 46.6¢ to 43.8¢; 19/32-in., 42.7¢ to 39.9¢. Base 5000 lb.

Drawn Wire: Coiled 0.051 to 0.274-in., 2S, 44.1¢ to 32.4¢; 52S, 53.4¢ to 39.1¢; 17S-T4, 60.1¢ to 41.8¢; 61S-T4, 53.9¢ to 41.3¢.

Extruded Tubing: Rounds, 63S-TS, OD 1 1/4 to 2-in., 31.6¢ to 60.7¢; 2 to 4 in., 37.7¢ to 61.1¢; 4 to 6 in., 38.2¢ to 46.6¢; 6 to 9 in., 38.7¢ to 48.8¢.

Roofing Sheet: Flat, per sheet, 0.082-in., 42¢ x 60 in., \$2.838; x 96 in., \$4.543; x 120 in., \$5.680; x 144 in., \$6.816. Coiled sheet, per lb, 0.019 in. x 28 in., \$0.816.

Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: FSI-O 1/4 in., 56¢; 3/16 in., 57¢; 1/2 in., 60¢; 0.004 in., 73¢; 0.032 in., 94¢. Specification grade higher. Base 30,000 lb.

Extruded Round Rod: M, diam 1/4 to 0.811 in., 77¢; 1/2 to 1 1/4 in., 60.5¢; 1 1/4 to 1.749 in., 66¢; 2 1/2 to 5 in., 51.5¢. Other alloys higher. Base up to 1/4 in. diam, 10,000 lb; 1/2 to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: M, in weight per ft, for perimeters less than size indicated: 0.10 to 0.11 lb, 5.5 in., 65.3¢; 0.22 to 0.25 lb, 6.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 69.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to 1/2 lb, 10,000 lb; 1/2 to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.040 to 0.057 in. wall thickness: OD, 1/4 to 5/16 in., \$1.43; 5/16 to 1/2 in., \$1.29; 1/2 to 5/8 in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall; OD, 5/8 to 1 in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1 1/2 in., 10,000 lb; 1 1/2 to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheets and strip, HR or CR, \$15; Plate, HR, \$12; Wire, rolled and/or drawn, \$11; Bar, HR or forged, \$6; Forgings, \$6.

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

"A" Nickel	Monel	Inconel
Sheet, CR	86 1/2	67 1/2
Strip, CR	92 1/2	70 1/2
Rod, bar	82 1/2	65 1/2
Angles, HR	82 1/2	65 1/2
Plate, HR	84 1/2	66 1/2
Seamless Tube	115 1/2	100 1/2
Shot, blocks	60	...

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Shapes
Copper	46.41	48.48	
Copper, h-r	48.38	44.73	...
Copper, drawn		45.98	...
Low brass	44.47	44.41	...
Yellow brass	41.72	41.66	...
Red brass	45.44	45.38	...
Naval brass	45.76	40.07	41.33
Leaded brass			39.11
Com. bronze	46.95	46.89	
Mang. bronze	49.48	43.62	45.18
Phos. bronze	66.58	67.08	
Muntz metal	43.96	39.77	41.02
NI silver, 10 pct	55.36	...	62.63

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	21.50
Aluminum pig	20.00
Antimony, American, Laredo, Tex.	28.50
Beryllium copper, per lb conta'd Be, \$40.00	
Beryllium aluminum 5% Be, Dollars per lb contained Be	\$72.75
Bismuth, ton lots	\$2.25
Cadmium, del'd	\$1.70
Cobalt, 97.99% (per lb)	\$2.60 to \$2.67
Copper, electro, Conn. Valley	30.00
Copper, Lake, delivered	30.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.8% dollars per troy oz.	\$2.25
Iridium, dollars per troy oz.	\$165 to \$175
Lead, St. Louis	13.80
Lead, New York	14.00
Magnesium 99.8+%, f.o.b. Freeport, Tex., 10,000 lb	27.00
Ingot	27.75
Magnesium, sticks, 100 to 500 lb	46.00 to 48.00
Mercury, dollars per 76-lb flask, f.o.b. New York	\$235 to \$238
Nickel electro, f.o.b. N. Y. warehouse	\$3.08
Nickel oxide sinter, at Creek	56.35
Palladium, dollars per troy oz.	\$21.00
Platinum, dollars per troy oz.	\$84 to \$87
Silver, New York, cents per oz.	85.25
Tin, New York	93.25
Titanium, sponge, grade A-1	\$4.72
Zinc, East St. Louis	10.25
Zinc, New York	10.75
Zirconium copper, 50 pct	\$6.30

REMELTED METALS

Brass Ingot

(Cents per lb delivered carloads)

85-5-5 Ingot	
No. 115	26.00
No. 120	25.25
No. 123	24.75
80-10-10 Ingot	
No. 305	31.00
No. 315	28.75
88-10-2 Ingot	
No. 210	40.75
No. 215	37.25
No. 245	32.25
Yellow Ingot	
No. 406	22.25
No. 421	26.75

Aluminum Ingot

95-5 aluminum-silicon alloys	
0.30 copper, max.	23.25-24.00
0.60 copper, max.	23.00-23.75
Piston alloys (No. 122 type)	21.00-23.00
No. 12 alum. (No. 2 grade)	20.50-21.00
108 alloy	20.50-21.50
195 alloy	22.00-22.75
13 alloy (0.60 copper max.)	23.00-23.75
ASX-679	20.50-21.50

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—96-97 1/2%	21.50-22.50
Grade 2—92-95%	20.50-21.50
Grade 3—90-92%	19.00-19.50
Grade 4—85-90%	18.00-18.50

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper	
Cast, oval, 15 in. or longer	44.54
Electrodeposited	38.38
Flat rolled	47.14
Brass, 80-20	
Cast, oval, 15 in. or longer	43.515
Zinc, flat cast	30.25
Ball, anodes	18.50
Nickel, 99 pct plus	
Cast	84.00
Cadmium	\$1.75
Silver 999 fine, rolled, 100 oz. lots per troy oz., f.o.b. Bridgeport, Conn.	94%

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63.90
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, f.r.t. allowed	30.00
Nickel chloride, 375 lb drum	38.00
Silver cyanide, 100 oz. lots, per oz.	75 1/2
Sodium cyanide, 96 pct domestic	
200 lb drums	19.25
Zinc cyanide, 100 lb drum	54.30

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

Heavy	Turnings
Copper	26
Yellow brass	19 1/2
Red brass	23
Comm. bronze	23 1/2
Mang. bronze	18 1/2
Yellow brass rod ends	19 1/2

Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26 1/2
No. 2 copper wire	25 1/2-25
Light copper	23 1/2-24
No. 1 composition	21 1/2
No. 1 comp. turnings	20 1/2
Rolled brass	17
Brass pipe	18 1/2
Radiators	17

Ingot Makers' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26 1/2-27
No. 2 copper wire	25 1/2-25 1/2
Light copper	23 1/2-24
No. 1 composition	21 1/2
No. 1 composition turnings	17 1/2-18
Unlined red car boxes	16
Cocks and faucets	16-17
Mixed heavy yellow brass	18
Old rolled brass	15 1/2
Brass pipe	16 1/2-17
New soft brass clippings	17 1/2-18
Brass rod ends	15-16
No. 1 brass rod turnings	14-15

Copper and Brass

(No. 1 heavy copper and wire

22 1/2
22 1/2
21 1/2
20 1/2
19 1/2

Nickel and Monel

Pure nickel clippings

60	-65
Clean nickel turnings	40
Nickel anodes	60
Nickel rod ends	60
New Monel clippings	22
Clean Monel turnings	14
Old sheet Monel	20
Nickel silver clippings, mixed	13
Nickel silver turnings, mixed	11

Lead

Soft scrap lead

11	-11 1/2
Battery plates (dry)	5 1/2-6
Batteries, acid free	4 1/2

Magnesium

Segregated solids

20	-21
Castings	19-

How a hot problem in steel stacks was solved with refractory concrete



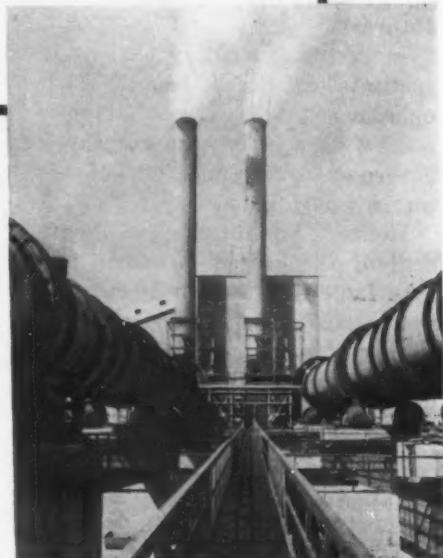
YOU'RE LOOKING UP one of the twin 215' steel stacks lined with refractory concrete at Basic Refractories, Inc.'s plant in Maple Grove, Ohio, for dead-burning granular refractories Smooth, jointless construction and insulating properties provided excellent natural draft. Such refractory linings assure structural strength, plus high resistance to heat and corrosion.

REFRACTORY concrete linings in stacks, breechings and ducts provide protection against heat, corrosion and the abrasive action of high-velocity gases and fly ash. Made with suitable aggregate and Lumnite® calcium-aluminate cement, they withstand temperatures to 2600° F., and are highly resistant to thermal shock. Smooth, jointless construction allows excellent draft in stacks, breechings and ducts.

Stack linings are just one of the many ways special concretes made with Lumnite are serving industrial plants. They are readily poured, plastered or "shot" in place by cement gun. There are no small units to work loose; maintenance is less-

ened. When necessary, repairs can be made quickly, easily and economically. Refractory concrete made with Lumnite Cement reaches service strength within 24 hours.

FOR CONVENIENCE, many prefer to make refractory concrete with prepared castables. (Lumnite Cement plus suitable aggregates selected for specific temperature and insulation service—add only water.) They're made by refractory manufacturers and sold through their dealers. For more information, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.



SPECIFIED TO MEET TOUGH DESIGN requirements, these stacks for large rotary kilns needed linings that could withstand 1400° to 1700° F. operating temperatures. Designers used an 8"-thick refractory concrete lining . . . poured in place.

*"LUMNITE" is the registered trade-mark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company.

IA-L-85

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Iron and Steel Scrap Markets

Spring Buying Fuels New Price Hikes

Almost all districts report price increases . . . Steelmaking grades up \$2 generally, \$4 in Detroit . . . See more hikes . . . Composite hits \$27.25 . . . Trade frowns on futures trading

Scrap prices continued to rise in almost all areas this week. A majority of districts reported increases of \$2 per ton for steelmaking grades. In Detroit the boost was \$4 and more. Chicago, which had paced the rise, was temporarily quiet, but there as elsewhere the trade felt that further hikes are in the cards. THE IRON AGE Steel Scrap Composite rose \$1.08 to \$27.25.

Dealers, brokers and consumers alike turned thumbs down to a bid by Chicago Mercantile Exchange to open trading in scrap iron and steel futures.

In fact, the Chicago chapter of Institute of Scrap Iron & Steel unanimously voted against the proposal 3 days before the exchange's governors voted in favor of the controversial issue.

Michael Rosenberg, Jr., president of the Chicago chapter, told THE IRON AGE the whole industry was against opening up scrap futures to "public speculation." This is in addition to the practical problems of grading, storage, and inspection that would have to be overcome before such a plan could work.

No date to start trading was announced pending determination of practices and policies to be followed. In spite of the widespread objections, exchange officials were confident that the contract will be adopted when it is fully understood.

Pittsburgh—No. 1 heavy melting steel moved up \$2 per ton to a top of \$30 this week on basis of mill buying and broker offerings. Secondary openhearth material was up \$1. An independent mill on the edge of the district made a limited purchase equivalent to \$30 for No. 1 and \$27 for No. 2 steel. This followed an earlier buy by another independent for \$29. Brokers are offering up to \$29 to fill the earlier order. Other grades moved

up in sympathy. Cast market also showed renewed strength, moving up \$1 per ton. Blast furnace grades are firm but unchanged.

Chicago—This market appears to be strong enough to support the present price levels and it may edge up a little more. However, it has reached a temporary plateau with the largest consumer purchasing at quoted prices. No buying of railroad grades materialized to change the pattern and most other buyers stayed out of the market for the time being.

Philadelphia—Prices moved upward this week in openhearth, electric furnace, some blast furnace and one cast grade. It was the first real boost for months but it resulted largely from Pittsburgh strength. Local situation resulted in a \$1.50 spread in some openhearth grades because of a 50¢ springboard to one mill.

New York—Steelmaking scrap moved up as much as \$2 in this area on the basis of out-of-district orders. Dealers are reported clearing out yard stocks at new prices but a further increase may be forthcoming if orders continue. Talk of exports continues to add strength to the market, but brokers report trouble in getting satisfactory terms from foreign customers.

Detroit—Market strength that had avoided Detroit like the plague finally reached the Motor City with a vengeance. Most steelmaking grades went up as much as \$4 and No. 1 bundles a fraction more than that. Source of the strength was the bidding on industrial lists, which was more spirited for May tonnage than it has been for months. Detroit prices had lagged behind other districts and the sudden upsurge should have brought them into line.

Cleveland—Local consumer has purchased No. 1 heavy melting at \$28, raising openhearth grades \$2 across

the board. Valley turnings also moved up \$1.50 to \$20 as new sales and bidding on industrials fired bullish sentiment. While Valley prices with the exception of turnings remained unchanged, an increase of at least \$2 for heavy melting was expected at press time.

Birmingham—Brokers report the scrap market is stronger but mills in the area are resisting increases in most grades. Increases of from \$1 to \$2 were posted this week in the rail division. Most brokers are covering cast orders at losses of from \$1 to \$2.

St. Louis—Watchful waiting policies of steel mills are being continued in this district. They are buying only such offerings as are made by local suppliers. An Iowa melter has increased the price \$1 per ton on bungs and turnings. Rails are in stronger demand, up \$1.

Cincinnati—A \$2 across the board increase has been chalked up here following release of May buying prices. Dealers who had been sitting on yard inventories generally welcomed new offers with open arms.

Buffalo—Underlying strength grips the market here but lack of business left openhearth and blast furnace prices unchanged. Cast prices advanced another \$1 on new sales. An inland port inquiry for No. 1 heavy melting at prevailing prices is the only firm bid in this market. However, sentiment was bolstered as one mill lifted an embargo on orders placed late in 1953 at prices substantially higher than previous quotations.

Boston—Strength continued to show in the New England market as a little buying from the Pittsburgh area on No. 1 and No. 2 heavy boosted quotations for all steelmaking grades. A few adjustments were made in other grades.

West Coast—Scrap market failed to reflect optimism in other areas last week. Tonnage remains constant and prices unchanged. One additional shipload of about 9000 tons of No. 2 heavy was expected in Oakland for loading for Japan this week, and a second scheduled in Los Angeles.

LIMA Type 44 ANSWERS DEMAND for One yard shovel and 25 ton crane

(AVAILABLE WITH CRAWLER, WHEEL OR TRUCK MOUNTING)



COMPARE!

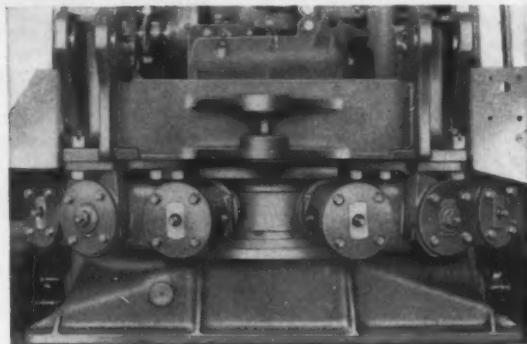
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1. All gears, smaller parts and shafts which are subject to extra wear, are flame or induction hardened for longer life.
2. Main machinery is placed well back of center of rotation, to eliminate excess counter-weight.
3. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
4. Big capacity drums and sheaves, lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
5. Propel and swing gears and power take-off, are enclosed in a sealed oil bath for dirt elimination and smoother, quieter operation.
6. Torque converter (optional), automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster.
7. COMPARE and you'll specify LIMA for shovels, ($\frac{3}{4}$ cu. yd. to 6 cu. yds.), cranes (to 110 tons) and draglines (variable).

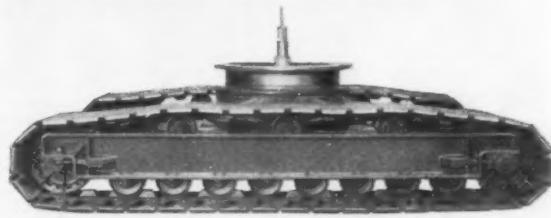
To meet the need for a 25 ton crane and 1 cubic yard shovel, Baldwin-Lima-Hamilton Corporation, is now producing the LIMA Type 44. As a shovel, it is equipped with 20 ft. boom and 15 ft. dipper handle. This latest addition, fills an important spot in the LIMA line, between the famous Paymaster (17½ ton crane— $\frac{3}{4}$ yard shovel) and model 604 (35 ton crane— $1\frac{1}{2}$ yard shovel).

Like its smaller brother, (Paymaster, Type 34), the LIMA Type 44 is available, with either crawler or rubber mountings. Wider, longer crawlers for greater stability and double sets of front cone rollers, to distribute the load more equally over a wider area, are some of the major design features.

For your copy of our Type 44 bulletin, please contact your nearby LIMA distributor, or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corp., Lima, Ohio.



The conical rollers are the hook type, four in front and two in the rear. The four front rollers are arranged in pairs and each pair is mounted in an equalizer frame.



An extra long Crawler (15'-0" long, 10'-8" wide), is available for work requiring greater stability.

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Comparison of Prices

(Effective May 4, 1954)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in Italics.

	May 4 1954	Apr. 27 1954	Apr. 6 1954	May 5 1954
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	3.925¢	3.925¢	3.925¢	3.775¢
Cold-rolled sheets	4.775	4.775	4.775	4.575
Galvanized sheets (10 ga.)	5.275	5.275	5.275	5.075
Hot-rolled strip	3.925	3.925	3.925	3.725
Cold-rolled strip	5.513	5.513	5.513	5.20
Plate	4.10	4.10	4.10	3.90
Plates wrought iron	9.80	9.80	9.80	9.00
Stain'l's C-R strip (No. 302)	41.50	41.50	41.50	39.75
Tin and Terneplate: (per base box)				
Tinplate, (1.50 lb.) cokes	\$8.95	\$8.95	\$8.95	\$8.95
Tinplate, electro (0.50 lb.)	7.65	7.65	7.65	7.65
Special coated mfg. terms	7.75	7.75	7.75	7.75
Bars and Shapes: (per pound)				
Merchant bars	4.16¢	4.16¢	4.16¢	3.95¢
Cold finished bars	5.20	5.20	5.20	4.925
Alloy bars	4.875	4.875	4.875	4.675
Structural shapes	4.10	4.10	4.10	3.85
Stainless bars (No. 302)	35.50	35.50	35.50	34.00
Wrought iron bars	10.40	10.40	10.40	10.05
Wire: (per pound)				
Bright wire	5.525¢	5.525¢	5.525¢	5.225¢
Rails: (per 100 lb.)				
Heavy rails	\$4.325	\$4.325	\$4.325	\$3.775
Light rails	5.20	5.20	5.20	4.25
Semifinished Steel: (per net ton)				
Rerolling billets	\$62.00	\$62.00	\$62.00	\$59.00
Slabs, rerolling	62.00	62.00	62.00	59.00
Forging billets	75.50	75.50	75.50	70.50
Alloy blooms, billets, slab	82.00	82.00	82.00	76.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.525¢	4.525¢	4.525¢	4.325¢
Skelp	3.75	3.75	3.75	3.55
Finished Steel Composite: (per pound)				
Base price	4.634¢	4.634¢	4.634¢	4.376¢

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

← To identify producers, see Key on p. 215 →

Producing Point	Basic	Fdry.	Mall.	Bess.	Lew Phes.
Bethlehem B3	58.00	58.50	59.00	59.50	
Birmingham R3	52.38	52.88			
Birmingham W9	52.38	52.88			
Birmingham S5	52.38	52.88			
Buffalo R3	56.00	56.50	57.00		
Buffalo H1	56.00	56.50	57.00		
Buffalo W6	56.00	56.50	57.00		
Chicago I4	56.00	56.50	56.50	57.00	
Cleveland A5	56.00	56.50	56.50	57.00	61.00
Cleveland R3	56.00	56.50	56.50	57.00	
Daingerfield L3	52.50	52.50	52.50		
Dubuth I4	56.00	56.50	56.50	57.00	
Erie I4	56.00	56.50	56.50	57.00	
Everett M6	61.25	61.75			
Fontana K1	62.00	62.50			
Geneva, Utah C7	56.00	56.50			
Granite City G2	57.90	58.40	58.90		
Hubbard Y1			56.50		
Minnequa C6	58.00	59.00	59.00		
Monessen P6	56.00				
Neville Is. P6	56.00	56.50	56.50		
Pittsburgh U1	56.00			57.00	
Sharpsville S3	56.00	56.50	56.50	57.00	
Steeltown B3	58.00	58.50	59.00	59.50	64.00
Swedeland A2	58.00	58.50	59.00	59.50	
Toledo I4	56.00	56.50	56.50	57.00	
Troy, N. Y. R3	58.00	58.50	59.00	59.50	64.00
Youngstown Y1			56.50	57.00	
N. Tonawanda T1		56.50	57.00		

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phes., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct., \$2 per ton for .05 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 and over.

Silvery Iron: Buffalo, H1, \$68.25; Jackson, J1, G1, \$67.00. Add \$1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add \$1 per ton for 0.75 pct. or more phosphorus. Add 75¢ for each 0.50 pct. manganese over 1.0 pct. Bessemer ferrosilicon prices are \$1 over comparable silvery iron.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

STAINLESS STEEL

Base price cents per lb., f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00		14.25
Slabs, billets, rerolling	20.50	22.75	24.75	23.75	36.25	29.50	32.25	18.25		18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50	35.25	39.50	24.00	24.50	24.50
Bars, wires, structurals	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75	45.75	51.25	30.00	30.50	30.50
Sheets	46.25	46.50	48.75	48.75	59.60	46.00	50.75	31.00		
Strip, hot-rolled	29.75	32.00	36.75	34.25	64.50	55.00	60.75	40.75	41.25	43.50
Strip, cold-rolled	38.25	41.50	45.50	43.75	66.50	54.50	59.25	34.25	41.25	34.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; McKeesport, Pa., U1; Washington, Pa., W1; J1; Baltimore, E1; Middletown, O., A7; Masillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., I2; Ft. Wayne, J4.

Strip: Midland, Pa., C11; Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W, Leechburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Middletown, O., A7; Harrison, N. J., D3; Youngstown, C5; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (25¢ per lb higher) W1 (25¢ per lb higher); New Bedford, Mass., R6.

Bar: Baltimore, A7; Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1; F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Masillon, O., R3; Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T3; Ft. Wayne, I4.

Wire: Waukegan, A5; Masillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monessen, P1; Syracuse, C11; Bridgeville, U2.

Structures: Baltimore, A7; Masillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11.

Plates: Brackenridge, Pa., A3; Chicago, A7; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., I2; Middletown, A7; Washington, Pa., J2; Cleveland, Masillon, R3; Coatesville, Pa., C15.

Forged discs, die blocks, rings: Pittsburgh, C11; Syracuse, C11; Ferndale, Mich., A3; Washington, Pa., J2.

Forging billets: Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Masillon, Canton, O., R1; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11.

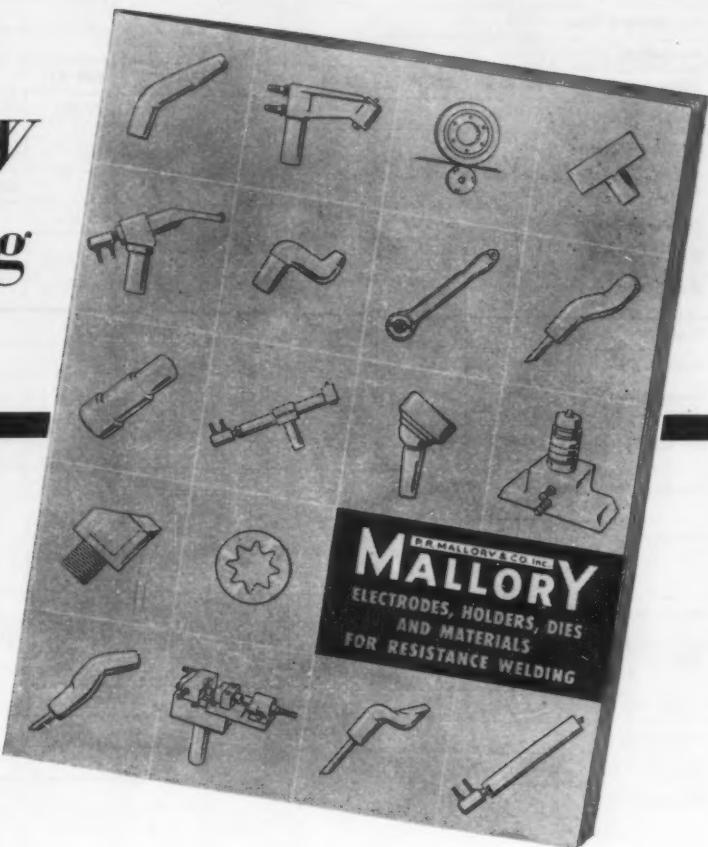
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IRON AGE			<i>Italics</i> identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.													
STEEL PRICES <i>(Effective May 1, 1954)</i>			BILLETS, BLOOMS, SLABS			PILING		SHAPES STRUCTURALS			STRIP					
			Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled	
EAST	Bethlehem, Pa.			\$82.00 <i>B3</i>			4.15 <i>B3</i>	6.20 <i>B3</i>	4.15 <i>B3</i>							
	Buffalo, N. Y.	\$62.00 <i>B3</i>	\$75.50 <i>R3</i> , <i>R3</i>	\$82.00 <i>B3</i> , <i>R3</i>	4.925 <i>B3</i>	4.15 <i>B3</i>	6.30 <i>B3</i>	4.15 <i>B3</i>	3.925 <i>B3</i> , <i>R3</i>	5.45 <i>B3</i>	6.00 <i>B3</i>	8.425 <i>B3</i>				
	Claymont, Del.															
	Coatesville, Pa.															
	Conshohocken, Pa.									4.65 <i>A2</i>		5.90 <i>A2</i>				
	New Bedford, Mass.										6.00 <i>R6</i>					
	Harrison, N. J.														12.00 <i>C1</i>	
	Johnstown, Pa.	\$62.00 <i>B3</i>	\$75.50 <i>B3</i>	\$82.00 <i>B3</i>		4.15 <i>B3</i>	6.20 <i>B3</i>									
	Fairless, Pa.															
	New Haven, Conn.											5.90 <i>D1</i> 6.20 <i>A5</i>				
	Phoenixville, Pa.					4.15 <i>P2</i>		4.15 <i>P2</i>								
	Sparrows Pt., Md.									3.925 <i>B3</i>	5.45 <i>B3</i>	6.00 <i>B3</i>	8.425 <i>B3</i>			
	Wallingford, Conn.										5.90 <i>W1</i>					
	Worcester, Mass.										6.30 <i>A5</i>				12.30 <i>A5</i> 12.45 <i>N7</i>	
MIDDLE WEST	Alton, Ill.									4.10 <i>L1</i>						
	Ashland, Ky.									3.925 <i>A7</i>						
	Canton-Massillon, Dover, Ohio			\$82.00 <i>R3</i> , <i>T5</i>											12.00 <i>G4</i>	
	Chicago, Ill.	\$62.00 <i>U1</i>	\$75.50 <i>R3</i> , <i>U1</i> , <i>W8</i>	\$82.00 <i>U1</i> , <i>W8</i> , <i>R3</i>	4.925 <i>U1</i>	4.10 <i>U1</i> , <i>W8</i>	6.175 <i>U1</i> , <i>Y1</i>	4.10 <i>U1</i>	3.925 <i>A1</i> , <i>W8</i>	5.70 <i>A1</i>	5.95 <i>R3</i>		6.40 <i>W8</i>			
	Cleveland, Ohio		\$75.50 <i>R3</i>								5.45 <i>A5</i> , <i>J3</i>		7.80 <i>J3</i> 8.15 <i>A5</i>		12.00 <i>A5</i> 12.15 <i>N7</i>	
	Detroit, Mich.			\$84.00 <i>R5</i>						4.075 <i>G3</i> 4.15 <i>M2</i>	5.60 <i>D1</i> , <i>D2</i> , <i>G3</i> , <i>M2</i> , <i>P11</i>	6.10 <i>G3</i>	7.90 <i>D2</i> 8.30 <i>G3</i>			
	Duluth, Minn.															
	Gary, Ind. Harbor, Indiana	\$62.00 <i>U1</i>	\$75.50 <i>U1</i>	\$82.00 <i>U1</i> , <i>Y1</i>	4.925 <i>I3</i>	4.10 <i>I3</i> , <i>U1</i>	6.175 <i>U1</i> , <i>I3</i>		3.925 <i>I3</i> , <i>U1</i> , <i>Y1</i>	5.70 <i>I3</i>	5.95 <i>U1</i> , <i>I3</i> 6.45 <i>Y1</i>		6.40 <i>U1</i>			
	Granite City, Ill.										5.60 <i>C5</i>					
	Indianapolis, Ind.															
	Mansfield, Ohio										5.45 <i>A7</i>					
	Middletown, Ohio										3.925 <i>S1</i>	5.45 <i>S1</i> , <i>T4</i>	5.95 <i>S1</i>	7.45 <i>S1</i>	8.40 <i>S1</i>	12.00 <i>S1</i>
	Niles, Warren, Ohio															
	Sharon, Pa.															
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$62.00 <i>U1</i> , <i>J3</i>	\$75.50 <i>J3</i> , <i>U1</i>	\$82.00 <i>U1</i> , <i>C11</i>	4.925 <i>U1</i>	4.10 <i>J3</i> , <i>U1</i>	6.175 <i>J3</i> , <i>U1</i>	4.10 <i>U1</i>	3.925 <i>A7</i> , <i>P6</i> 3.95 <i>S7</i> 4.425 <i>S9</i>	5.45 <i>B4</i> , <i>J3</i> , <i>S7</i>		7.80 <i>J3</i>	6.40 <i>S9</i> 6.45 <i>S7</i>	12.00 <i>S9</i> 12.15 <i>S7</i>		
	Portsmouth, Ohio									3.925 <i>P7</i>						
	Wheeling, W. Va.						4.10 <i>W3</i>			3.925 <i>W3</i>	5.45 <i>F3</i> , <i>W3</i>	5.95 <i>W3</i>	8.15 <i>W3</i>			
	Youngstown, Ohio			\$82.00 <i>Y1</i> , <i>C10</i>		4.10 <i>Y1</i>	6.675 <i>Y1</i>		3.925 <i>R3</i> , <i>U1</i> , <i>Y1</i>	5.45 <i>R3</i> , <i>Y1</i> , <i>C5</i>	5.95 <i>U1</i> , <i>R3</i> 6.45 <i>Y1</i>	7.60 <i>R3</i> 8.30 <i>Y1</i>	6.40 <i>U1</i>	12.00 <i>C5</i>		
WEST	Fontana, Cal.	\$70.00 <i>K1</i>	\$83.50 <i>K1</i>	\$101.00 <i>K1</i>		4.75 <i>K1</i>	6.825 <i>K1</i>	5.10 <i>K1</i>	4.70 <i>K1</i>	7.35 <i>K1</i>	7.05 <i>K1</i>		7.80 <i>K1</i>	13.65 <i>K1</i>		
	Geneva, Utah		\$75.50 <i>C7</i>			4.10 <i>C7</i>	6.175 <i>C7</i>									
	Kansas City, Mo.					4.70 <i>S2</i>	6.775 <i>S2</i>		4.525 <i>S2</i>		6.55 <i>S2</i>			7.00 <i>S2</i>		
	Los Angeles, Calif.		\$85.00 <i>B2</i>	\$102.00 <i>B2</i>		4.80 <i>B2</i> , <i>C7</i>	6.85 <i>B2</i>		4.675 <i>B2</i> , <i>C7</i>	7.50 <i>C1</i>				7.60 <i>B2</i>		
	Minnequa, Colo.					4.55 <i>C6</i>			5.025 <i>C6</i>							
	San Francisco, Niles, Pittsburg, Cal.					4.75 <i>B2</i> 4.91 <i>P9</i>	6.80 <i>B2</i>		4.675 <i>B2</i> , <i>C7</i>							
	Seattle, Wash.					4.85 <i>B2</i>	6.90 <i>B2</i>									
SOUTH	Atlanta, Ga.								4.125 <i>A8</i>							
	Fairfield, Ala. City, Birmingham, Ala.	\$62.00 <i>T2</i>	\$75.50 <i>T2</i>			4.10 <i>R3</i> , <i>T2</i>	6.175 <i>T2</i>		3.925 <i>R3</i> , <i>T2</i> , <i>C16</i>		5.95 <i>T2</i>					
	Houston, Tex.		\$83.50 <i>S2</i>	\$90.00 <i>S2</i>		4.50 <i>S2</i>			4.325 <i>S2</i>					6.80 <i>S2</i>		

STEEL PRICES

(Effective May 4, 1954)

 Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

EAST

MIDDLE WEST

WEST

SOUTH

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE		
	Hot-rolled 18 ga. & h.vyr.	Cold- rolled	Galvanized 10 ga.	Enamel- ing 12 ga.	Long Terne 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot- rolled 19 ga.		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.	
Allegheny, Pa.														
Buffalo, N. Y.	3.925 B3	4.775 B3				5.90 B3	7.225 B3			4.525 W6				
Claymont, Del.														
Coatesville, Pa.														
Conshohocken, Pa.	3.975 A2					5.90 A2								
Harrisburg, Pa.														
Hartford, Conn.														
Johnstown, Pa.										4.525 B3				
Fairless, Pa.	3.975 U1	4.825 U1				5.95 U1	7.275 U1				\$8.80 U1	\$7.50 U1		
New Haven, Conn.														
Phoenixville, Pa.														
Sparrows Pt., Md.	3.925 B3	4.775 B3	5.275 B3			5.90 B3	7.225 B3	8.075 B3		4.625 B3	\$9.80 B3	\$7.50 B3		
Worcester, Mass.											4.825 A5			
Trenton, N. J.														
Alton, Ill.											4.70 L1			
Ashland, Ky.	3.925 A7		5.275 A7	5.175 A7										
Canton-Massillon, Deer, Ohio			5.275 R1, R3								5.05 R1			
Chicago, Joliet, Ill.	3.925 A1, W8					5.90 U1					4.525 A5, N4,R3			
Sterling, Ill.											4.625 N4			
Cleveland, Ohio	3.925 J3, R3	4.775 J3, R3		5.175 R3		5.90 J3, R3	7.225 J3, R3				4.525 A5			
Detroit, Mich.	4.075 G3, M2	4.925 G3				6.05 G3	7.375 G3							
Newport, Ky.	3.925 N5													
Gary, Ind. Harbor, Indiana	3.925 J3, U1,Y1	4.775 J3, U1,Y1	5.275 U1, I3	5.175 I3, U1	5.675 U1	5.90 U1,J3 6.40 Y1	7.225 U1 7.725 Y1				\$8.70 J3, U1,Y1	\$7.40 J3, U1	6.10 U1, Y1	
Grande City, Ill.	4.125 G2	4.975 G2	5.475 G2	5.375 G2								\$7.60 G2	6.30 G2	
Kokomo, Ind.	4.025 C9		5.375 C9								5.025 C9	4.625 C9		
Mansfield, Ohio														
Middletown, Ohio		4.775 A7		5.175 A7	5.675 A7						5.05 E2			
Niles, Ohio Sharon, Pa.	3.925 S1 5.175 N3	5.80 N3	5.275 N3	6.525 N3	5.45 S1 5.675 N3	5.90 S1							\$7.40 R3	
Pittsburgh, Pa. Midland, Pa. Butler, Pa.	3.925 J3, U1,P6, A7	4.775 J3, U1,P6	5.275 U1	5.175 U1		5.90 J3, U1	7.225 J3, U1	7.925 U1			4.525 A5 4.725 P6	\$9.70 J3, U1	\$7.40 J3, U1	6.10 U1
Portsmouth, Ohio	3.925 P7	4.775 P7										4.525 P7		
Weirton, Wheeling, Follansbee, W. Va.	3.925 W3, W5	4.775 W3, W5,F3		5.275 W3, W5		5.675 W3, W5	5.90 W3	7.225 W3				\$8.70 W3, W5	\$7.40 W3, W5	6.10 F3, W5
Youngstown, Ohio	3.925 R3, U1,Y1	4.775 R3, Y1		5.175 Y1		5.90 U1,R3 6.40 Y1	7.225 R3 7.725 Y1				4.525 Y1	\$8.70 R3		
Fountain, Cal.	4.70 K1	5.875 K1				6.675 K1	8.275 K1				5.325 K1			
Geneva, Utah	4.025 C7													
Kansas City, Mo.														
Los Angeles, Torrance, Cal.	4.625 C7		6.275 C7											
Minnequa, Colo.														
San Francisco, Niles, Pittsburg, Cal.	4.625 C7	5.725 C7	6.025 C7											
Seattle, Wash.														
Atlanta, Ga.														
Fairfield, Ala. Alabama City, Ala.	3.925 R3, T2	4.775 T2	5.275 R3, T2			5.90 T2					5.125 T2 5.225 R3	4.525 T2 R3	\$3.80 T2	\$7.50 T2
Houston, Texas	4.325 S2											4.925 S2		

IRON AGE		Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.										
STEEL PRICES <i>(Effective May 4, 1954)</i>		BARS					PLATES				WIRE	
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Migr. Bright
EAST	Bethlehem, Pa.				4.875 B3	6.325 B3	6.225 B3					
	Buffalo, N. Y.	4.15 B3 4.18 R3	4.15 B3,R3	5.25 B5	4.875 B3,R3	6.325 B3,B5	6.225 B3	4.10 B3			6.25 B3	5.525 W6
	Claymont, Del.							4.10 C4			5.55 C4	
	Coatesville, Pa.							4.10 L4			5.55 L4	
	Conshohocken, Pa.							4.10 A2	5.15 A2		6.25 A2	
	Harrisburg, Pa.							4.10 C3	5.15 C3			
	Hartford, Conn.			5.75 R3		6.775 R3						
	Johnstown, Pa.	4.15 B3	4.15 B3		4.875 B3		6.225 B3	4.10 B3		5.55 B3	6.25 B3	5.525 B3
	Fairless, Pa.	4.30 U1	4.30 U1		5.025 U1							
	Newark, N. J.			5.65 W10		6.65 W10						
	New Haven, Conn.											
	Camden, N. J.			5.65 P10		6.60 P10						
	Putnam, Conn.			5.75 W10								
	Sparrows Pt., Md.		4.15 B3					4.10 B3		5.55 B3	6.25 B3	5.625 B3
	Palmer, Worcester, Mansfield, Mass.			5.75 B5 6.10 W11		6.775 B5						5.825 A5, W6
	Readville, Mass.			5.75 C14								
MIDDLE WEST	Alton, Ill.	4.35 L1										5.70 L1
	Ashland, Ky.							4.10 A7				
	Canton-Massillon, Ohio			5.20 R2,R3	4.875 R3,T5	6.325 R2,R3, T5						
	Chicago, Joliet, Ill.	4.15 U1, N4,W8 4.22 R3	4.15 R3,N4	5.20 A5,W10, W8,B5,L2	4.875 U1, W8,R3	6.325 A5,W8, W10,L2, R3,B5		4.10 U1,W8	5.15 U1	5.55 U1	6.25 U1	5.525 A1, R3,N4,W7
	Cleveland, Ohio	4.21 R3	4.15 R3	5.20 A5,C13		6.325 A5, C13		4.10 J3,R3	5.15 J3		6.25 J3	5.525 A5, R3,C13
	Detroit, Mich.	4.30 R5,G3		5.35 R5,P8 5.40 B5 5.45 P3	4.975 R5 5.025 G3	6.425 R5 6.475 P8 6.525 B5,P3	6.375 G3	4.25 G3			6.40 G3	
	Duluth, Minn.											5.525 A5
	Gary, Ind. Harbor, Crawfordsville	4.15 I3, U1, Y1	4.15 I3, U1, Y1	5.20 R3	4.875 I3, U1, Y1	6.325 R3,M5	6.225 U1,I3 6.725 Y1	4.10 I3, U1, Y1	5.15 I3	5.55 U1	6.25 U1,I3 6.75 Y1	5.625 M4
	Granite City, Ill.							4.30 G2				
	Kokomo, Ind.											5.625 C9
	Sterling, Ill.	4.25 N4	4.25 N4									5.625 N4
	Niles, Ohio Sharon, Pa.							4.10 SI		5.55 SI	6.25 SI	
	Pittsburgh, Pa. Midland, Pa.	4.15 J3, U1	4.15 J3, U1	5.20 A5,J3, W10,R3,C8	4.875 U1,C11	6.325 A5,C11, W10,C8	6.225 J3, U1	4.10 J3, U1	5.15 U1	5.55 U1	6.25 J3, U1	5.525 A5, J3,P6
	Portsmouth, Ohio											5.525 P7
	Weirton, Wheeling, Follansbee, W. Va.	4.15 W3						4.10 W3				
	Youngstown, Ohio	4.15 U1,Y1 4.20 R3	4.15 R3,U1, Y1	5.20 Y1,F2	4.875 U1,Y1, C10	6.325 Y1, C10,F2	6.225 U1 6.725 Y1	4.10 R3,U1, Y1			6.75 Y1	5.525 Y1
WEST	Emeryville, Cal.	4.90 J5	4.90 J5									
	Fontana, Cal.	4.85 K1	4.85 K1		5.925 K1		7.475 K1	4.75 K1		6.60 K1	6.95 K1	
	Geneva, Utah							4.10 C7			6.25 C7	
	Kansas City, Mo.	4.75 S2	4.75 S2		5.475 S2		6.825 S2					6.125 S2
	Los Angeles, Terrance, Cal.	4.85 B2,C7	4.85 B2,C7	6.65 R3	5.925 B2		6.925 B2					6.475 B2
	Minnequa, Colo.	4.60 C6	4.75 C6					4.95 C6				5.775 C6
	Portland, Ore.	4.90 O2										
	San Francisco, Niles, Pittsburg, Cal.	4.85 C7,P9 4.90 B2	4.85 C7,P9 4.90 B2				6.975 B2					6.475 C7
	Seattle, Wash.	4.90 B2,N6	4.90 B2				6.975 B2	5.00 B2			7.15 B2	
	Atlanta, Ga.	4.35 A8	4.35 A8									5.725 A8
SOUTH	Fairfield, Ala. City, Birmingham, Ala.	4.15 T2,C16 4.18 R3	4.15 R3,T2, C16				6.225 T2	4.10 R3,T2		6.25 T2	5.525 R3, T2	
	Houston, Ft. Worth, Lone Star, Tex.	4.55 S2	4.55 S2		5.275 S2			4.50 L3,S2				5.925 S2

Steel Prices

(Effective May 1, 1954)

Key to Steel Producers

With Principal Offices

- A1 Acme Steel Co., Chicago
- A2 Alan Wood Steel Co., Conshohocken, Pa.
- A3 Allegheny Ludlum Steel Corp., Pittsburgh
- A4 American Cladmetals Co., Carnegie, Pa.
- A5 American Steel & Wire Div., Cleveland
- A6 Angell Nail & Chaplet Co., Cleveland
- A7 Armc Steel Corp., Middletown, O.
- A8 Atlantic Steel Co., Atlanta, Ga.

- B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
- B2 Bethlehem Pacific Coast Steel Corp., San Francisco
- B3 Bethlehem Steel Co., Bethlehem, Pa.
- B4 Blair Strip Steel Co., New Castle, Pa.
- B5 Blaw & Laughlin, Inc., Harvey, Ill.

- C1 Calstrip Steel Corp., Los Angeles
- C2 Carpenter Steel Co., Reading, Pa.
- C3 Central Iron & Steel Co., Harrisburg, Pa.
- C4 Clayton Products Dept., Clayton, Del.
- C5 Cold Metal Products Co., Youngstown
- C6 Colorado Fuel & Iron Corp., Denver
- C7 Columbia Geneva Steel Div., San Francisco
- C8 Columbia Steel & Shafing Co., Pittsburgh
- C9 Continental Steel Corp., Kokomo, Ind.
- C10 Copperweld Steel Co., Pittsburgh, Pa.
- C11 Crucible Steel Co. of America, New York
- C12 Cumberland Steel Co., Cumberland, Md.
- C13 Cuyahoga Steel & Wire Co., Cleveland
- C14 Compressed Steel Shafting Co., Readville, Mass.
- C15 G. O. Carlson, Inc., Thorndale, Pa.
- C16 Connors Steel Div., Birmingham

- D1 Detroit Steel Corp., Detroit
- D2 Detroit Tube & Steel Div., Detroit
- D3 Driver Harris Co., Harrison, N. J.
- D4 Dickson Weatherproof Nail Co., Evanston, Ill.

- E1 Eastern Stainless Steel Corp., Baltimore
- E2 Empire Steel Co., Mansfield, O.

- F1 Firth Sterling, Inc., McKeesport, Pa.
- F2 Fitzsimmons Steel Corp., Youngstown
- F3 Follansbee Steel Corp., Follansbee, W. Va.

- G1 Globe Iron Co., Jackson, O.

- G2 Granite City Steel Co., Granite City, Ill.
- G3 Great Lakes Steel Corp., Detroit
- G4 Greer Steel Co., Dover, O.

- H1 Hanna Furnace Corp., Detroit
- H2 Ingersoll Steel Div., Chicago
- H3 Inland Steel Co., Chicago
- H4 Interlake Iron Corp., Cleveland

- J1 Jackson Iron & Steel Co., Jackson, O.
- J2 Jessop Steel Corp., Washington, Pa.
- J3 Jones & Laughlin Steel Corp., Pittsburgh
- J4 Joslyn Mfg. & Supply Co., Chicago
- J5 Judson Steel Corp., Emeryville, Calif.

- K1 Kaiser Steel Corp., Fontana, Cal.
- K2 Keystone Steel & Wire Co., Peoria
- K3 Koppers Co., Granite City, Ill.

- L1 Laclede Steel Co., St. Louis
- L2 La Salle Steel Co., Chicago
- L3 Lone Star Steel Co., Dallas
- L4 Lukens Steel Co., Coatesville, Pa.

- M1 Mahoning Valley Steel Co., Niles, O.
- M2 McLouth Steel Corp., Detroit
- M3 Mercer Tube & Mfg. Co., Sharon, Pa.
- M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
- M5 Monarch Steel Co., Inc., Hammond, Ind.
- M6 Mystic Iron Works, Everett, Mass.

- N1 National Supply Co., Pittsburgh
- N2 National Tube Co., Pittsburgh
- N3 Niles Rolling Mill Div., Niles, O.
- N4 Northwestern Steel & Wire Co., Sterling, Ill.
- N5 Newport Steel Corp., Newport, Ky.
- N6 Northwest Steel Rolling Mills, Seattle
- N7 Newman Crosby Steel Co., Pawtucket, R. I.

- O1 Oliver Iron & Steel Co., Pittsburgh
- O2 Oregon Steel Mills, Portland

- P1 Page Steel & Wire Div., Monessen, Pa.
- P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
- P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
- P4 Pittsburgh Coke & Chemical Co., Pittsburgh
- P5 Pittsburgh Screw & Bolt Co., Pittsburgh
- P6 Pittsburgh Steel Co., Pittsburgh
- P7 Portsmouth Div., Detroit Steel Corp., Detroit

- R1 Reeves Steel & Mfg. Co., Dover, O.
- R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
- R3 Republic Steel Corp., Cleveland
- R4 Roebling Sons Co., John A., Trenton, N. J.
- R5 Rotary Electric Steel Co., Detroit
- R6 Rodney Metals, Inc., New Bedford, Mass.
- R7 Rome Strip Steel Co., Rome, N. Y.

- S1 Sharon Steel Corp., Sharon, Pa.
- S2 Sheffield Steel Corp., Kansas City
- S3 Shenango Furnace Co., Pittsburgh
- S4 Simonds Saw & Steel Co., Fitchburg, Mass.
- S5 Sloss Sheffield Steel & Iron Co., Birmingham
- S6 Standard Forging Corp., Chicago
- S7 Stanley Works, New Britain, Conn.
- S8 Superior Drawn Steel Co., Monaca, Pa.
- S9 Superior Steel Corp., Carnegie, Pa.
- S10 Sweet's Steel Co., Williamsport, Pa.

- T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
- T2 Tennessee Coal & Iron Div., Fairfield
- T3 Tennessee Products & Chem. Corp., Nashville
- T4 Thomas Strip Div., Warren, O.
- T5 Temken Steel & Tube Div., Canton, O.
- T6 Tremont Nail Co., Wareham, Mass.
- T7 Texas Steel Co., Fort Worth

- U1 United States Steel Corp., Pittsburgh
- U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
- U3 Fred Ulbrich & Sons, Wallingford, Conn.

- W1 Wallingford Steel Co., Wallingford, Conn.
- W2 Washington Steel Corp., Washington, Pa.
- W3 Weirton Steel Co., Weirton, W. Va.
- W4 Wheatland Tube Co., Wheatland, Pa.
- W5 Wheeling Steel Corp., Wheeling, W. Va.
- W6 Wickwire Spencer Steel Div., Buffalo
- W7 Wilson Steel & Wire Co., Chicago
- W8 Wisconsin Steel Co., S. Chicago, Ill.
- W9 Woodward Iron Co., Woodward, Ala.
- W10 Wycoff Steel Co., Pittsburgh
- W11 Worcester Pressed Steel Co., Worcester, Mass.

- Y1 Youngstown Sheet & Tube Co., Youngstown

PIPE AND TUBING

Base discounts (per) f.o.b. mills. Base price about \$200 per net ton.

	BUTTWELD														SEAMLESS																
	1/2 in.		3/4 in.		1 in.		1 1/4 in.		1 1/2 in.		2 in.		2 1/2 - 3 in.		2 in.		2 1/2 in.		3 in.		3 1/2 - 4 in.										
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.					
STANDARD T. & C.																															
Sparrows Pt. B3	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0																	
Youngstown R3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0																	
Fentana K1	13.25	+2.0	16.25	1.0	18.75	4.5	21.25	5.5	21.75	6.5	22.25	7.0	23.75	7.0																	
Pittsburgh J3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5									
Alton, Ill. L1	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0																	
Sharon M3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0																	
Fairless N2	24.25		27.25		29.75		32.25		32.75		33.25		34.75																		
Pittsburgh N1	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5									
Wheeling W5	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0																	
Wheatland W4	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0																	
Youngstown Y1	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5									
Indiana Harbor Y1	25.25	9.0	28.25	13.0	30.75	16.5	33.25	17.5	33.75	18.5	34.25	19.0	35.75	19.0																	
Lorain N2	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5									
EXTRA STRONG PLAIN ENDS																															
Sparrows Pt. B3	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0																	
Youngstown R3	27.75	15.0	31.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0																	
Fentana K1	16.75		20.75		22.75		23.25		23.75		24.25		24.75																		
Pittsburgh J3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75									
Alton, Ill. L1	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0																	
Sharon M3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0																	
Pittsburgh N1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75									
Wheeling W5	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0																	
Youngstown Y1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75									
Indiana Harbor Y1	28.75	14.0	32.75	18.0	34.75	21.5	35.25	20.5	35.75	21.5	36.25	22.0	36.75	21.0																	
Lorain N2	28.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75									

Galvanized discounts based on zinc, at 11¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: 1/2 in., 3/4 in., and 1 in., 1 pt.; 1 1/4 in., 2 in., 3/4 pt.; 2 1/2 in., 3 in., 1/2 pt. Calculate discounts on even cents per lb of zinc, i.e., if zinc is 16.5¢ to 17.5¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢. East St. Louis zinc price now 10.25¢.

Steel Prices

(Effective May 4, 1954)

To identify producers, see Key on preceding page

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer <i>U</i>	4.325	5.20	5.275				
So. Chicago <i>R</i>			7.05				
Cleveland <i>R</i>							
Ensey <i>T</i>	4.325	5.20					
Fairfield <i>T</i>		5.20	7.05	5.125			
Gary <i>U</i>	4.325	5.20			5.125		
Ind. Harbor <i>I</i>	4.325	5.275	5.275	7.05	5.125		
Johnstown <i>B</i>							
Joliet <i>U</i>							
Kansas City <i>S</i>	4.325	5.20	5.275			7.30	11.00
Lackawanna <i>B</i>						5.125	
Lebanon <i>B</i>					10.50	11.00	
Minnequa <i>C</i>	4.325	5.70	5.275	7.05	5.125	11.00	
Pittsburgh <i>O</i>					16.50	11.00	
Pittsburgh <i>P</i>					10.50	11.00	
Pittsburgh <i>J</i>							
Pitt's, Cal. <i>C</i>						5.275	
Seattle <i>B</i>					7.55	5.275	11.50
Steeltown <i>B</i>	4.325		5.275			5.125	
Struthers <i>Y</i>							
Terrace <i>C</i>						5.275	
Youngstown <i>R</i>					7.05	5.275	

ELECTRICAL SHEETS

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Hot-Rolled (Cut Lengths) ^a	Cold-Reduced (Coiled or Cut Length)	
			F.o.b. Mill Cents Per Lb	Semi- Processed
				Fully Processed
Field			Field	8.05
Armature			8.15	8.40
Elect.			8.75	9.00
Motor			9.75	10.00
Dynamo			10.65	10.90
Trans. 72			11.60	11.85
Trans. 65			12.15	
Trans. 58			12.65	Trans. 88.....16.25
Trans. 52			13.65	Trans. 73.....16.75

Producing points: Beech Bottom (*W*); Brackenridge (*A*); Granite City (*G*); Indiana Harbor (*I*); Mansfield (*E*); Newport, Ky. (*N*); Niles, O. (*N*); Vandergrift (*U*); Warren, O. (*R*); Zanesville (*A*). * Coils 75¢ higher.

CLAD STEEL		Plate	Sheet
Stainless-carbon No. 304, 20 p.c.			
Coatesville, Pa. <i>L</i>	*32.7		
Washington, Pa. <i>J</i>			
Claymont, Del. <i>C</i>			
New Castle, Ind. <i>I</i>			32.50
Nickel-carbon 10 pct. Coatesville, Pa. <i>L</i>	37.5		
Inconel-carbon 10 pct., Coatesville, Pa. <i>L</i>	46.10		
Mone-carbon 10 pct. Coatesville, Pa. <i>L</i>	38.90		

* Includes annealing and pickling, sandblasting.

Cities	City Delivery Charge	Base price, f.o.b., dollars per 100 lb.														
		Sheets		Strip	Plates	Shapes	Bars		Alloy Bars							
		Hot-Rolled	Cold-Rolled (15 gauge)	Galvanized (10 gauge)		Hot-Rolled	Cold-Rolled	Standard Structural	Hot-Rolled A-415	As rolled	Hot-Rolled A-4140	As rolled	Cold-Drawn A-415	As rolled	Cold-Drawn A-4140	As rolled
Baltimore	\$.20	6.20	7.12	7.36	7.00		6.85	6.98	6.86	8.17						
Birmingham	.15	6.10	7.00	8.00 ^b	6.30		6.35	6.35	6.15	8.30						
Boston	.20	6.89	7.83	9.18	7.13	9.35 ^c	7.13	7.06	6.87	8.35	12.40	11.94-12.28	14.65	14.55-14.58		
Buffalo	.20	6.18	7.15	8.70	6.65		6.65	6.55-	6.35	7.70		11.95-12.15	14.45	14.25-14.55		
Chicago	.20	6.18	7.12	8.00	6.42		6.33	6.46	6.28	7.30		11.60		14.05		
Cincinnati	.20	6.30	7.11		6.66		6.62	6.93	6.52	7.60		11.85		14.30		
Cleveland	.20	6.18	7.12	7.90	6.58		6.50	6.79	6.34	7.40	12.04	11.74	14.29	14.19		
Denver		7.95	8.85	10.45	8.20	9.55	7.95	7.95	8.05	9.05				15.75		
Detroit	.20	6.35	7.29	8.42	6.69	7.36	6.80	6.91	6.56	7.60	12.47	11.92	14.42	13.44-14.62		
Houston	.20	7.15	7.45	9.23	7.45		7.20	7.35	7.45	9.30		12.80				
Kansas City	.20	6.85			7.09		7.00	7.13	6.95	8.07						
Los Angeles	.20	7.25	9.00	9.35	7.55		7.20	7.35	7.15	9.10-		12.90		15.90		
Memphis	.10	6.79	7.69		6.90		7.01	7.09	6.88	7.89-						
Milwaukee	.20	6.35	7.29	8.17	6.59		6.50	6.63	6.45	7.57		11.77		14.22		
New Orleans	.15	6.51	7.41		6.63		6.73	6.81	6.60	8.37						
New York	.30	6.78	7.75	8.41 ^d	7.16	9.15 ^e	6.99	6.90	7.06	8.43	12.29	11.99	14.54	14.44		
Norfolk	.20	6.90			7.00		7.00	7.00	7.00	8.50						
Philadelphia	.25	6.35	7.13	7.87	7.02		6.63	6.67	6.87	8.19		11.74		14.19		
Pittsburgh	.20	6.18	7.12	8.30	6.55		6.33	6.46	6.28	7.65		11.60		14.05		
Portland	.10	7.90	8.45	9.05-	7.65		7.30	7.25	7.35	10.65						
		8.75	9.75	9.15												
Salt Lake City	.20	8.60	10.50	10.50 ^f	9.25		8.10	8.25	9.20	11.25						
San Francisco	.20	7.35	8.70	10.15	7.60		7.20	7.25	7.15	9.75		12.90		15.90		
Seattle	.20	7.95	9.30-	9.80	7.80-		7.40	7.30-	7.40	10.45-		13.15		15.60		
		8.15	9.50	9.00	7.60											
St. Louis	.20	6.48	7.42	8.25-	6.72	7.70-	6.73	6.86	6.58	7.70	12.20	11.90	14.45	14.30-14.35		
					8.30		8.53									
St. Paul	.15	6.84	7.78	8.66	7.08	13.22	6.99	7.12	6.94	8.06		12.42				
					8.33											

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.

Exceptions: (*) 500 to 1499 lb. (*) 2000 lb or over. (*) 450 to 1499 lb. (*) 500 to 9999 lb. (*) 1000 lb or over. (*) 400 to 1499 lb. (*) 1500 to 3499 lb. (*) 2000 to 5999 lb.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Col	Col	Col	Standard & Coated Nails	
				Woven Wire Fence 9-15½ ga.	" ¹ " Fence Posts Single Loop Bale Ties Galv. Barbed and Twisted Barbless Wire March. Wire Awn'ld Stirr. Wires - Galv.
Alabama City <i>R</i>	131	140		149	153 6.675-7.075
Aliquippa, Pa. <i>J</i>	131	143		149	150 6.675-7.25
Atlanta <i>A</i>	133	145		151	150 6.775-7.10
Bartonsville <i>K</i>	133	144		151	157 6.775-7.275
Buffalo <i>W</i>					
Chicago, Ill. <i>N</i>	131	143	149	149	150 6.675-7.25
Cleveland <i>A</i>	137				
Crawfordville <i>M</i>	133	145	151	153 6.775-7.25	
Donora, Pa. <i>A</i>	131	140	149	149	153 6.675-7.05
Duluth <i>A</i>	131	140	149	149	153 6.675-7.05
Fairfield, Ala. <i>T</i>	131	140	149	149	153 6.675-7.05
Galveston <i>D</i>	139	148			
Houston <i>S</i>	139	148			
Johnstown, Pa. <i>B</i>	131	143	145	150	156 6.675-7.225
Joliet, Ill. <i>A</i>	131	145	149	149	153 6.675-7.05
Kokomo, Ind. <i>C</i>	133	142	151	151	155 6.775-7.175
Kansas City <i>S</i>	143	152	161	161	163 6.725-7.075
Minnequa <i>C</i>	136	148	150	154	162 6.725-7.25
Monessen <i>P</i>	131	145	151	151	157 6.675-7.25
Moline, Ill. <i>R</i>					
Pittsburgh, Cal. <i>C</i>	150	163	173	173	173 6.675-8.05
Portsmouth <i>P</i>					
Rankin, Pa. <i>A</i>	131	140	145	149	153 6.675-7.05
So. Chicago <i>R</i>	131	140	145	149	153 6.675-7.05
S. San Francisco <i>C</i>	133				
Sparrows Pt. <i>B</i>	133				
Struthers, O. <i>Y</i>					
Worcester, Mass. <i>A</i>	137				
Youngstown <i>C</i>	133	150			

Cut Nails, carloads, base \$8.00 per kg (less 20¢ to jobbers), at Conshohocken, Pa. (*A*). Alabama City and So. Chicago don't include zinc extra.

Galvanized products computed with zinc at 11.8¢ per lb.

* Sold on Pittsburgh base.

BOILER TUBES

F.o.b. Mill	Size	Seamless		Elec. Weld.	
		OD- In.	B.W. Ga.	H.R. C.D.	H.R. C.B.
Babcock & Wilcox	2	13	27.34	32.98	26.51
	2½	1			



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Makers of Hand and Power Hack Saw
Blades, Frames, Metal and Wood Cutting
Band Saw Blades and Clemson Hand and
Power Lawn Machines.



May 6, 1954

Miscellaneous Prices

(Effective May 4, 1954)

TOOL STEEL

F.o.b. Mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	\$1.48
18	4	1	—	5	2.16
18	4	2	—	—	1.64
1.5	4	1.5	8	—	.895
6	4	2	6	—	1.005
High-carbon chromium					
Oil hardened manganese					
Special carbon					
Extra carbon					
Regular carbon					
Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.					

CAST IRON WATER PIPE

Per Net Ton

6 to 24-in., del'd Chicago	\$111.80 to \$115.30
6 to 24-in., del'd N. Y.	115.00 to 116.00
6 to 24-in., Birmingham	98.00 to 102.50
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipments less	\$129.50 to \$131.50
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. Prices effective July 1, 1953, to end of 1954 season.

Gross Ton

Openhearth lump	\$11.15
Old range, bessemer	10.30
Old range, nonbessemer	10.15
Mesabi, bessemer	10.05
Mesabi, nonbessemer	9.90
High phosphorus	9.90

Prices based on upper Lakes rail freight rates, Lake vessel freight rates, handling and unloading charges, and taxes thereon, in effect on June 24, 1953. Increases or decreases after such date are for buyer's account.

COKE

Furnace, beehive (f.o.b. oven) Net-Ton Connellsville, Pa. \$14.25 to \$14.50

Foundry, beehive (f.o.b. oven) Connellsville, Pa. \$16.50 to \$17.00

Foundry, oven coke	
Buffalo, del'd	\$28.08
Chicago, f.o.b.	24.50
Detroit, f.o.b.	25.50
New England, del'd	26.05
Seaboard, N. J., f.o.b.	24.00
Philadelphia, f.o.b.	23.95
Swedeland, Pa., f.o.b.	23.85
Painesville, Ohio, f.o.b.	24.00
Erle, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, f.o.b.	22.65
Lone Star, Tex., f.o.b.	18.50

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed

GRAPHITE			CARBON		
Diam. (in.)	Length (in.)	Price	Diam. (in.)	Length (in.)	Price
24	84	20.50	40	100, 110	8.95
20	72	20.00	35	110	8.95
12 to 18	72	20.50	30	110	8.95
7 to 10	60	21.00	24	72 to 84	9.10
8	60	23.25	20	90	8.95
4	40	26.00	17	72	9.10
3	40	27.25	14	72	9.50
2½	30	28.00	10, 12	60	10.30
2	24	43.50	8	60	10.55



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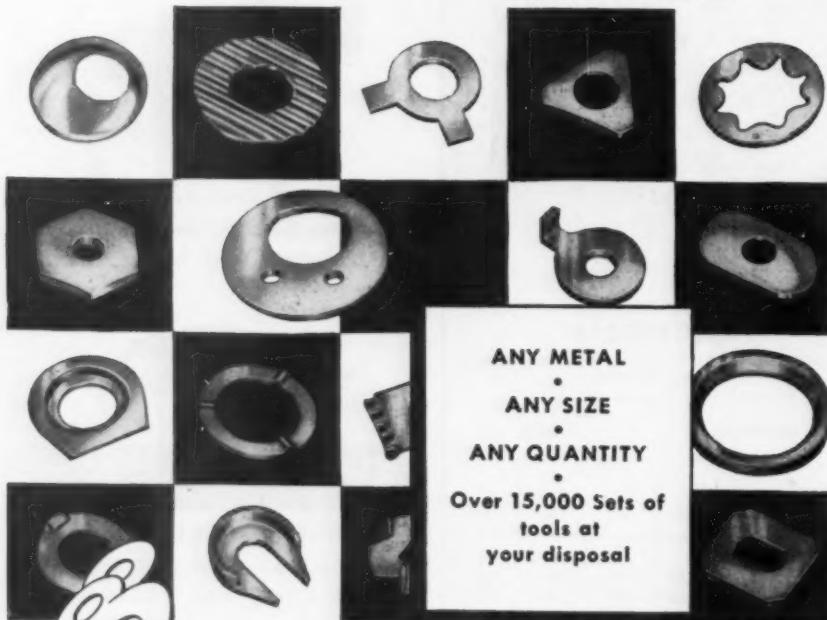
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Miscellaneous Prices (Effective May 1, 1951)

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base, discount, f.o.b. mill, Pittsburgh,
Cleveland, Birmingham or Chicago)

Nuts, Hot Pressed, Cold Punched— $\frac{1}{2}$

	Net Off List	Less Keg	Less Keg	Reg. K.	Hvy. K.
1/16 in. & smaller	+2	15	+2	18	
9/16 in. & $\frac{1}{2}$ in.	+7	11	+32	+10	
$\frac{3}{4}$ in. to $1\frac{1}{2}$ in.					
inclusive	+8	10	+27**	+15	
1 $\frac{1}{2}$ in. & larger	+9	9	+27	+6	
* 9/16 to $\frac{3}{4}$ in.					
** $\frac{3}{4}$ to $1\frac{1}{2}$ in.					

Nuts, Hot Pressed—Hexagon

1/4 in. & smaller	11	26	3	23
9/16 in. & $\frac{3}{4}$ in.	2	18	+20	net
$\frac{3}{4}$ in. to $1\frac{1}{2}$ in.				
inclusive	+6	12	+25	+4
1 $\frac{1}{2}$ in. & larger	+8	10	+25	+4

Nuts, Cold Punched—Hexagon

1/4 in. & smaller	11	26	8	23
9/16 in. & $\frac{3}{4}$ in.	9	24	+2	16
$\frac{3}{4}$ in. to $1\frac{1}{2}$ in.				
inclusive	+1	16	+9	9
1 $\frac{1}{2}$ in. & larger	+16	8	+20	net

Nuts, Semi-Finished—Hexagon

1/4 in. & smaller	23	36	14	23
9/16 in. & $\frac{3}{4}$ in.	18	32	4	20
$\frac{3}{4}$ in. to $1\frac{1}{2}$ in.				
inclusive	8	23	+8	10
1 $\frac{1}{2}$ in. & larger	+14	5	+20	net

Light

7/16 in. & smaller	33	43
or	33	43
1/2 in. thru $\frac{3}{4}$ in.	26	37
$\frac{3}{4}$ in. to $1\frac{1}{2}$ in.		
inclusive	18	30

Steve Bolts

Packaged, steel, plain finished	44 $\frac{1}{2}$ —10	Pet Off List
Packaged, plain finish	25 $\frac{1}{2}$ —10	
Bulk, plain finish**	59*	

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets

Base per 100 lbs	
1/2 in. & larger	\$3.30
7/16 in. and smaller	Pet Off List

Cap and Set Screws

(In bulk)	Pet Off List
Hexagon head cap screws, coarse or fine thread, $\frac{1}{4}$ in. thru $\frac{3}{4}$ in. x 6 in., SAE 1020, bright	
$\frac{3}{4}$ in. thru 1 in. up to & including 6 in.	
$\frac{3}{4}$ in. thru $\frac{3}{4}$ in. x 6 in. & shorter	
high C double heat treat	
$\frac{3}{4}$ in. thru 1 in. up to & including 6 in.	
Milled studs	
Flat head cap screws, listed sizes	
Fillister head cap, listed sizes	
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	

Machine and Carriage Bolts

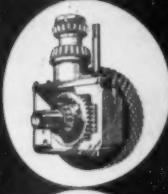
Pet Off List	
Less Case	C.
1/2 in. & smaller x 6 in. & shorter	4
9/16 in. & $\frac{3}{4}$ in. x 6 in. & shorter	5
$\frac{3}{4}$ in. & larger x 6 in. & shorter	3
All diam. longer than 6 in.	+4
Lag, all diam. x 6 in. & shorter	12
Lag, all diam. longer than 6 in.	3
Plow bolts	30

4 Big Reasons

why you should buy a
**Hydrolectric
LIFT TRUCK**



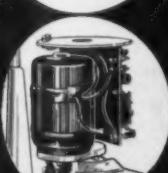
CONTROL
COMPLETE
at your finger
tips



SEALED ALLOY
GEAR DRIVE
for long
service life



TWIN DRIVE
WHEELS
with differential
for ease of
steering and
good stability



HEAVY DUTY
MOTOR
completely
enclosed—
highly efficient
easy accessibility

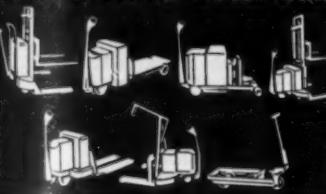


Compare the Hydroelectric features with any other "Driver Lead" Lift Truck. The Hydroelectric quality of construction merits your inquiry. Two driving wheels instead of one — 50% easier steering — ease of maintenance.

Write for Catalogue #35 today showing various models and their features. NOTE: The Dyna-Dual Power Unit is interchangeable on all models.

LIFT TRUCKS
INCORPORATED

2422-31 SPRING GROVE AVE CINCINNATI 14, OHIO



Miscellaneous Prices

(Effective May 4, 1954)

REFRACTORIES

	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$109.00
No. 1 Ohio	102.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	102.00
No. 2 Ohio	93.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$1.50)	16.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$115.00
Childs, Hays, Pa.	120.00
Chicago District	125.00
Western Utah	131.00
California	138.00
Super Duty	
Hays, Pa., Athens, Tex., Windham	132.00
Curtner, Calif.	150.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	19.00
Silica cement, net ton, bulk, Hays, Pa.	21.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	20.00
Silica cement, net ton, bulk, Utah and Calif.	28.50

Chrome Brick

	Per net ton
Standard chemically bonded Balt.	\$86.00
Standard chemically bonded, Curtner, Calif.	96.25
Burned, Balt.	80.00

Magnesite Brick

Standard Baltimore	\$109.00
Chemically bonded, Baltimore	97.50

Grain Magnesite

	St. % -in. grains
Domestic, f.o.b. Baltimore	
In bulk fines removed	\$64.40
Domestic, f.o.b. Chewelah, Wash., Luning, Nev.	
In bulk	38.00
In sacks	43.75

Dead Burned Dolomite

	Per net ton
F.o.b., bulk, producing points in:	
Pa., W. Va., Ohio	\$14.50
Midwest	14.60
Missouri Valley	13.65

FLUORSPAR

Washed gravel, f.o.b. Rosiclare, Ill.	
Price, net ton; Effective CaF ₂ content	
72 1/4%	\$44.00
70% or more	42.50
60% or less	38.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron, c.i.f.	
New York, ocean bags	11.25¢
Canadian sponge iron, del's.	
In East	12.0¢
Domestic sponge iron, 98 + % Fe	
Electrolytic iron, annealed	18.0¢
Electrolytic iron, unannealed, minus 325 mesh, 99 + % Fe	44.0¢
Hydrogen reduced iron minus 300 mesh, 98 + % Fe	60.0¢
Carbonyl iron, size 5 to 10 mils, 99.8 + % Fe	\$3.00 to \$1.48
Aluminum	31.5¢
Brass, 10 ton lots	29.50¢ to 36.50¢
Copper, electrolytic	43.50¢
Copper, reduced	43.50¢
Cadmium, 100-199 lb 95¢ plus metal value	
Chromium, electrolytic, 99% min., and quality, del'd	\$3.60
Lead	21.00¢
Manganese	57.0¢
Molybdenum, 99%	\$2.75
Nickel, unannealed	89.50¢
Nickel, annealed	96.50¢
Nickel, spherical, unannealed	93.50¢
Silicon	43.50¢
Solder powder	7.0¢ to 9.0¢ plus met. value
Stainless steel, 302	91.0¢
Stainless steel, 316	\$1.10
Tin	14.04¢ plus metal value
Tungsten, 99% (65 mesh)	\$4.65
Zinc, 10 ton lots	17.5¢ to 25.0¢

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Oxygen and
Nitrogen in
One Generator

... and Save
Up to 50%!



With INDEPENDENT'S newly-designed generators, you can make your own high-purity oxygen and nitrogen from the free air . . . and in the same generator.

You reduce costs up to 50% by eliminating handling costs . . . vaporizing costs . . . evaporation losses . . . residual losses . . . and transportation costs.

INDEPENDENT Generators are available in any capacity, any purity and any pressure. Put your oxygen-nitrogen problem up to us . . . our engineering department will gladly submit recommendations . . . no obligation, of course!

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O'FALLON 4, ILLINOIS

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SERVICE

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per
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...and smart gear buyers

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the best in custom gears.



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THE CINCINNATI GEAR CO. • CINCINNATI 27, OHIO

Ferroalloy Prices

(Effective May 4, 1955)

Ferrochrome

Contract prices, cents per lb contained Cr, lump size, bulk, in carloads, delivered.	
65-72% Cr, 2% max. Si.	
0.025% C .. 34.50	0.20% C .. 33.50
0.06% C .. 34.50	0.50% C .. 33.25
0.10% C .. 34.00	1.00% C .. 33.00
0.15% C .. 33.75	2.00% C .. 32.75
65-69% Cr, 4.9% C ..	34.75
62-66% Cr, 4.6% C, 6-9% Si ..	35.00

S. M. Ferrochrome

Contract price, cents per pound, chrome contained, lump size, delivered.	
High carbon type: 60.65% Cr, 4.6% Si, 4-6% Mn, 4-6% C.	
Carloads	25.95
Ton lots	24.00
Less ton lots	23.00

High-Nitrogen Ferrochrome

Low-carbon type 67-72% Cr, 0.75% N	
Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.	
Carloads	25.95
Ton lots	24.00
Less ton lots	23.00

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.	
0.10% max. C ..	\$1.18
0.50% max. C ..	1.14
9 to 11% C ..	1.11

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.)	
Contract price, carloads, f.o.b. Niagara Falls, freight allowed, lump 4-in. x down, 24.75¢ per lb contained Cr plus 10.8¢ per lb contained Si. Bulk 2-in. x down, 25.05¢ per lb contained Cr plus 10.8¢ per lb contained Si. Bulk 1-in. x down, 25.25¢ per lb contained Cr plus 11.0¢ per lb contained Si.	
Carloads	19.00
Ton lots	22.10
Less ton lots	23.00

Calcium-Silicon

Contract price per lb of alloy, lump, delivered.	
30-33% Cr, 60-65% Si, 3.00 max. Fe.	
Carloads	19.00
Ton lots	22.10
Less ton lots	23.00

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads	20.00
Ton lots	22.30
Less ton lots	23.30

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Cr, 20% Fe 1/2 in. x 12 mesh.	
Ton lots	17.50
Less ton lots	19.50

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.	
Carload lots	16.60
Ton lots	18.18
Less ton lots	19.35

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed	17.50
Ton lots to carload packed	18.50
Less ton lots	20.00

Ferromanganese

Maximum contract base price, f.o.b. lump size, base content 74 to 75 pct Mn;

Producing Point Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.

Clairton, Pa. 16.00

Sheridan, Pa. 17.50

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk 12.50

Ton lots, packed 14.00

Ferrealloy Prices

(Effective May 4, 1954)

Spiegeleisen

Contract prices, per gross ton, lump. f.o.b. Palmerston, Pa.	
Manganese	Silicon
16 to 19%	3% max.
19 to 21%	3% max.
21 to 23%	3% max.
23 to 25%	3% max.

\$84.00
86.00
88.50
91.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max.	
Si 2.5% max. Fe.	36.95
Carload, packed	38.45
Ton lots	

30.00
32.00
34.00
37.00
1.50

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.	
Carloads	30.00
Ton lots	32.00
250 to 1999 lb	34.00
Less than 250 lb	37.00
Premium for hydrogen-removed metal	1.50

30.00
32.00
34.00
37.00
1.50

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn	
Carloads	21.35¢

21.35¢

Low-Carb Ferromanganese

Contract price, cents per pound Mn con- tained, lump size, del'd Mn 85-90%.	
Carloads	Less
0.07% max. C, 0.06%	
P, 90% Mn	30.00
0.07% max. C	27.95
0.15% max. C	27.45
0.30% max. C	26.95
0.50% max. C	26.45
0.75% max. C, 80-85%	23.45
Mn, 5.0-7.0% Si	25.30
	26.50

30.05
31.00
30.50
30.00
29.50

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢.	
Carload bulk	11.00
Ton lots	12.65
Briquet contract basis carloads, bulk, delivered, per lb of briquet	12.65
Ton lots, packed	14.25

11.00
12.65
12.65
14.25

Silvery Iron (electric furnace)

Sl 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$92.00 gross ton, freight allowed to normal trade area.	
Sl 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$89.50. Add \$1.00 per ton for each additional 0.50% Sl up to and including 17%. Add \$1.46 for each 0.50% Mn over 1%.	
Ton Lots	Carloads
96% Sl, 2% Fe	20.10
97% Sl, 1% Fe	20.60
	18.00
	18.50

20.10
20.60

Silicon Metal

Contract price, cents per pound contained
Si, lump, bulk, carloads, delivered.

Ton Lots Carloads

96% Si, 2% Fe

97% Si, 1% Fe

20.10

20.60

18.00

18.50

17.50

19.50

18.10

19.35

18.60

19.10

19.35

18.80

19.50

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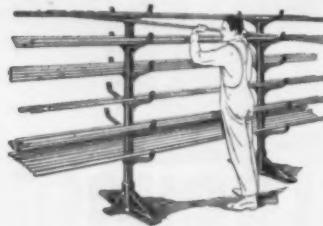
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makes good equipment better

ALL METAL—Withstand vibration, shock, high temperatures, corrosive conditions.

SELF CONTAINED—No assembling of the lock nut before using.

LOCK TIGHTER—Conditions of vibration improve the locking-power. There is no need to replace An-cor-lox lock nuts after use.

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Digest of the Week in Metalworking

help you find your favorite features.

**IT PAYS TO READ
IRON AGE ADS TOO!**

Ferroalloy Prices

(Effective May 4, 1951)

Alumina , 20% Al, 40% Si, 40% Fe, contract basis f.o.b. Suspension Bridge, N. Y., per lb.	
Carloads	\$1.56
Ton lots	10.15
Calcium molybdate , 46.2-46.6% f.o.b. Langloch, Pa., per pound contained Mo	\$1.15
Ferrocolumbium , 50-60%, 3 in. x D contract basis, delivered per pound contained Cb.	
Ton lots	\$1.50
Less ton lots	9.55
Ferro-Tantalum-Columbium , 20% Ta, 40% Cb, 40% C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta	\$1.75
Fermolybdenum , 55-75%, f.o.b. Langloch, Pa., per pound contained Mo	\$1.32
Ferrophosphorus , electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton	\$90.00
10 tons to less carload	\$110.00
Ferrotitanium , 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	\$1.35
Ferrotitanium , 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	\$1.50
Less ton lots	1.55
Ferrotitanium , 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton	\$177.00
Ferrotungsten , 3/4 x down packed, per pound contained W. ton lots, f.o.b.	\$3.80
Molybde oxide , briquets or cans, per lb contained Mo, f.o.b. Langloch, Pa., bags, f.o.b. Washington, Pa., Langloch, Pa.	\$1.14
Simanil , 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk lump	\$1.50
Ton lots, bulk lump	15.75
Less ton lots, lump	16.35
Vanadium Pentoxide , 86-89% V ₂ O ₅ , contract basis, per pound Contained V ₂ O ₅	\$1.28
Zirconium , 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	\$1.00
Zirconium , 12-15%, contract basis, lump, delivered, per lb of alloy.	
Carload, bulk	\$1.00
Boron Agents	
Borosil , contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B	\$1.35
Bortam , f.o.b. Niagara Falls	
Ton lots, per pound	45
Less ton lots, per pound	50
Corbortam , Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.	
Ton lots per pound	10.00
Ferroboron , 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, Ton lots F.o.b. Wash., Pa.; 100 lb up	
10 to 14% B	1.50
14 to 19% B	1.20
19% min. B	1.50
Grainal , f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over	
No. 1	\$1.00
No. 6	83
No. 79	50
Manganese-Boron , 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.	
Ton lots	\$1.45
Less ton lots	1.57
Nickel-Boron , 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered	
Less ton lots	\$2.05
Silicon , contract basis, delivered	
Ton lots	45.00

THE IRON AGE